PB83-159285

Environmental Impact Statement, Blount County Tennessee, Wastewater Facilities (Draft)

(U.S.) Environmental Protection Agency
Atlanta, GA

Dec 82

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO. EPA 904/9-82-103

2.

3. Recipient's Accession No. PB83 159285

4. Title and Subtitle

Blount County, Tennessee Wastewater Facilities
Draft Environmental Impact Statement

5. Report Date December 1982

6.

7. Author(s) Environmental Assessment Branch, NEPA Compliance Section

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

U.S. EPA, Environmental Assessment Branch
345 Courtland Street
Atlanta, GA 30365

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.

(C)

(G)

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered Draft

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This Draft EIS addresses proposed wastewater facilities for Blount County, Tennessee. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Blount County Area.

17. Document Analysis a. Descriptors

Blount Co.
TN
Wastewater Facilities

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report)

20. Security Class (This Page)

21. No. of Pages

22. Price

(See ANSI–Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-
(For

United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta, GA 30365

EPA 904/9-82-103
December, 1982

PB83-159285

EPA

Environmental Impact Statement

Draft

Blount County, Tennessee Wastewater Facilities

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
for
BLOUNT COUNTY, TENNESSEE

Prepared by
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

This Draft EIS addresses proposed wastewater facilities for Blount County, Tennessee. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Blount County area.

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Oct. 1, 1982
Date

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Executive Summary

EXECUTIVE SUMMARY FOR THE
ENVIRONMENTAL IMPACT STATEMENT

BLOUNT COUNTY, TENNESSEE
WASTEWATER FACILITIES

Draft (X)
Final ( )

Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Type of Action:
Administrative Action (X)
Legislative Summary ( )

EXECUTIVE SUMMARY

PART A - NEED FOR ACTION

The Environmental Impact Statement (EIS) for Blount County addresses alternative wastewater management facilities and the potential impacts of these facilities. The study area for the EIS includes the northern half of Blount County with the exclusion of the cities of Maryville and Alcoa as shown on Figure 1.

Centralized wastewater transmission systems are operated within Maryville, Alcoa and adjacent areas of Blount County by the Maryville Utilities Board (MUB), the City of Alcoa and the Blount County Utilities Board respectively. All centralized wastewater treatment and disposal within Blount County is conducted by the MUB at their treatment plant with surface discharge to the Tennessee River. A small number of independently operated package plants also exist. Most of the rural area is served by on-lot septic tank systems.

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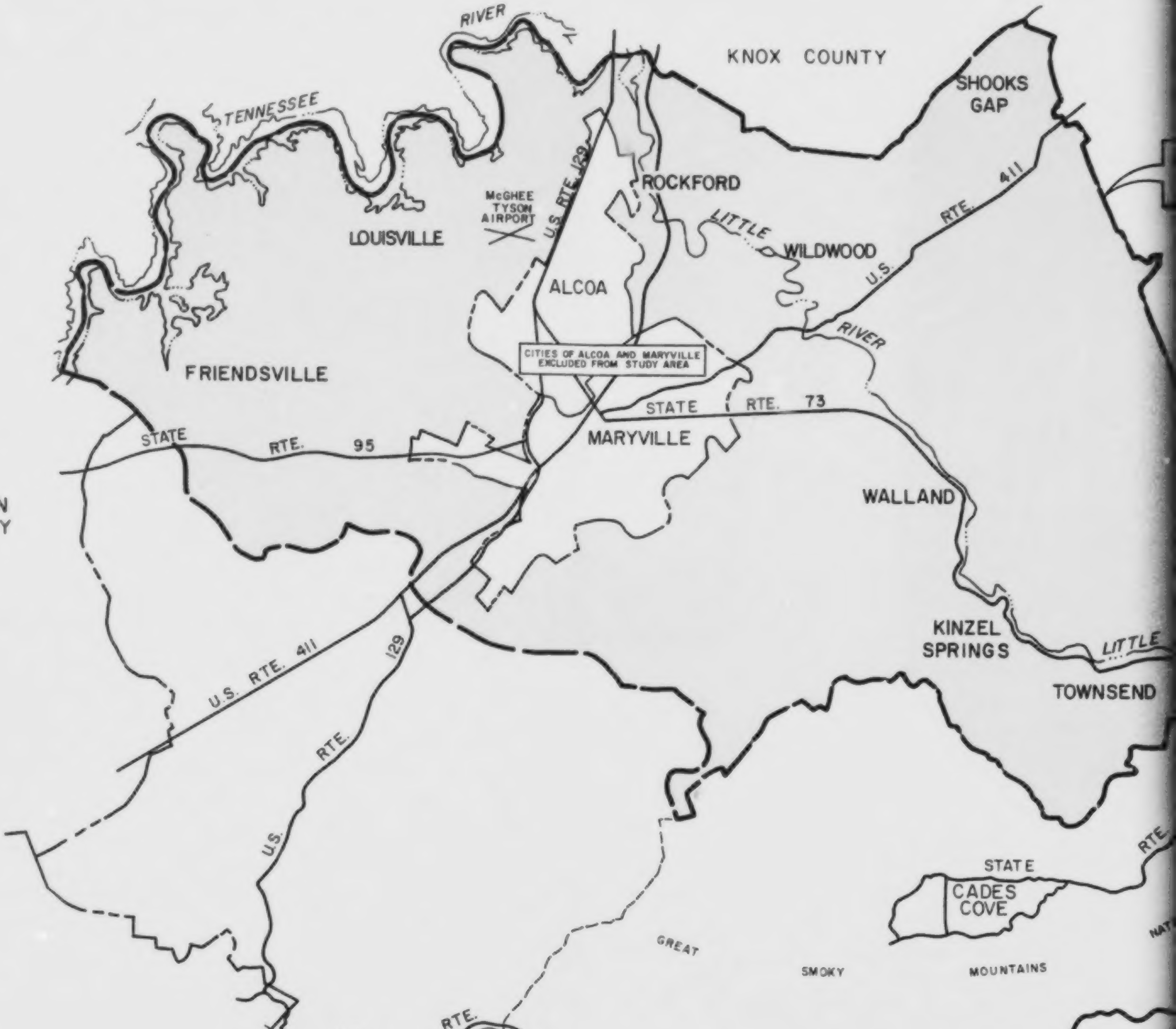


RIVER
TENNESSEE
KNOX COUNTY
SHOOKS GAP
ROCKFORD
McGHEE TYSON AIRPORT
U.S. RTE. 129
LOUISVILLE
LITTLE
WILDWOOD
U.S. RTE. 411
ALCOA
RIVER
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
FRIENDSVILLE
STATE RTE. 73
MARYVILLE
STATE RTE. 95
LOUDON COUNTY
WALLAND
KINZEL SPRINGS
LITTLE
TOWNSEND
U.S. RTE. 411
U.S. RTE. 129
STATE RTE.
CADES COVE
GREAT SMOKY MOUNTAINS
NAT
U.S. RTE.
LITTLE
MONROE COUNTY
129
TENNESSEE RIVER
NORTH CAROLINA

AREA

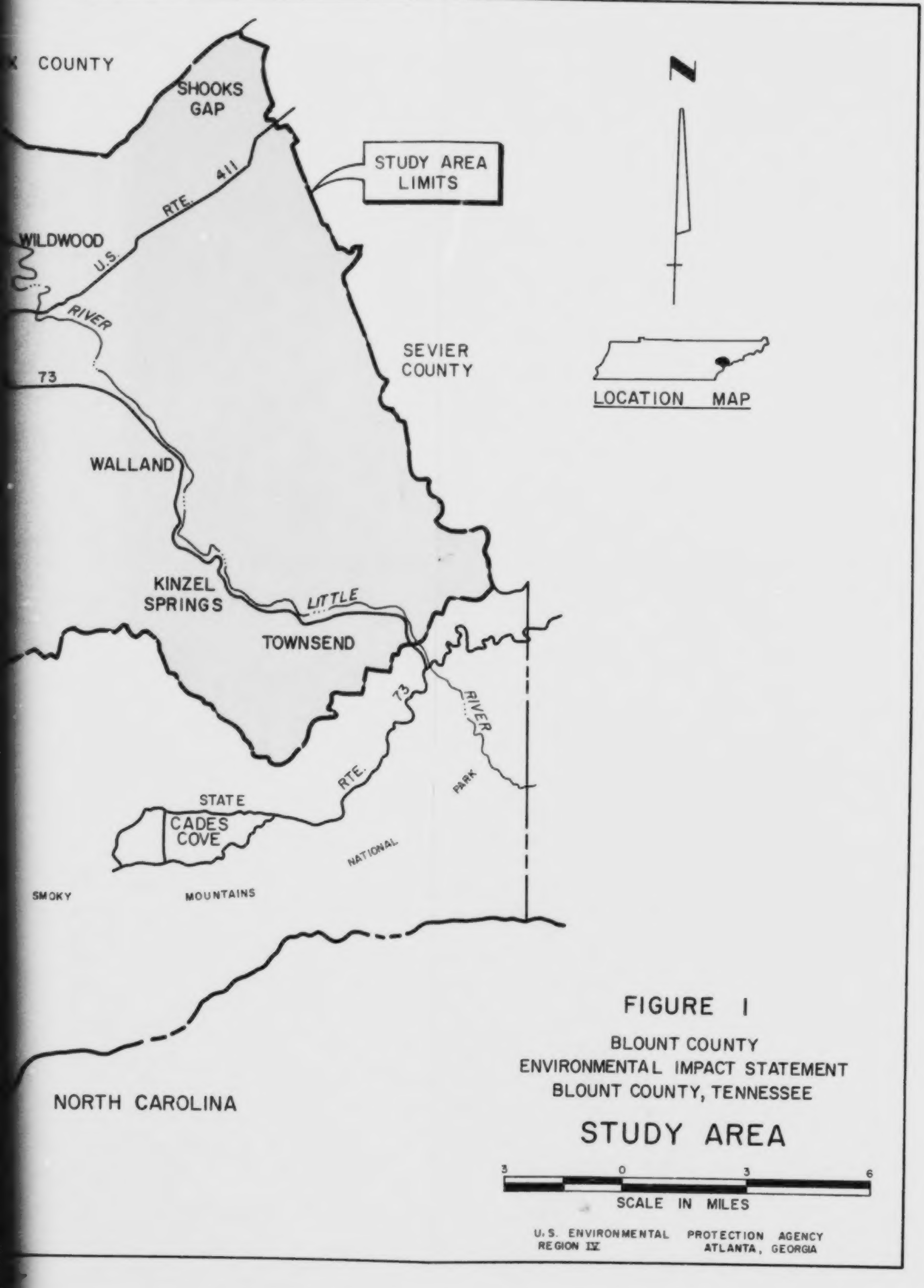

X COUNTY
SHOOKS GAP
STUDY AREA LIMITS
U.S. RTE. 411
WILDWOOD
RIVER
73
SEVIER COUNTY
LOCATION MAP
WALLAND
KINZEL SPRINGS
LITTLE
TOWNSEND
RIVER
RTE. 73
STATE
CADES COVE
PARK
NATIONAL
SMOKY
MOUNTAINS
NORTH CAROLINA
3
0
3
6
SCALE IN MILES

FIGURE 1

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

STUDY AREA

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

In 1976, the local applicants completed preparation of a 201 Wastewater Facilities Plan. The plan proposed an extensive series of interceptor lines throughout the County including service to many existing rural areas. The plan became very controversial due to a high potential for growth in environmentally sensitive areas. The most controversy centered on the Townsend area. Particular concern was directed toward the impacts of growth on the Little River, prime agricultural lands and the existing life style of the area. The 201 Plan was based on the assumption that extensive resort oriented growth would soon occur in the Townsend area.

Because of the controversy surrounding growth in the Townsend area and potential impacts to environmentally sensitive areas, the Environmental Protection Agency (EPA) decided to prepare an EIS with respect to wastewater management facilities to serve Blount County. Subsequently, a Notice of Intent was issued by the EPA Regional Administrator on November 14, 1979.

PART B - DESCRIPTION OF THE ALTERNATIVES

Projected populations and wastewater flows were developed for the study area. Feasible alternatives were then developed by combining wastewater service configurations and treatment and disposal techniques. The remainder of this section presents a description of each of the final set of alternatives for wastewater management which were evaluated in the EIS. Maps depicting the configurations of these alternatives are presented in Chapter II of this EIS on Figures 2-2 through 2-6.

Alternative 1, The No Federal Action Alternative

This alternative assumes that federal grant funds are not available to Blount County and that future wastewater management facilities are developed with local funding. In the heavily developed areas adjacent to Maryville and Alcoa, it is likely that sewers would be gradually extended from the existing system when it is financially feasible. A small community system is projected for Townsend. In the remainder of the

County, treatment and disposal of wastewater are projected to be handled by on-lot systems.

Alternative 2, The On-lot Systems Alternative

This alternative is comprised of two components. First is the federally funded renovation of existing on-lot systems in the study area which are presently malfunctioning or failing. Based on the study of on-lot failures by EPA, this is estimated to be about 15% of all present systems. These renovations are federally fundable only if an on-lot wastewater management agency is set up at the local level. This agency would be responsible for the proper installation, operation and maintenance of on-lot systems in Blount County. The second component is the non-federally funded development of on-lot systems to accommodate the wastewater needs of new development in all parts of the study area. The cost for this alternative also includes a small community system in the Townsend area which may be necessary during the planning period.

Alternative 3, Small Community Systems Alternative

This alternative would consist of 35 individual, federally funded small community systems. A variety of options for collection, treatment and disposal were considered including gravity sewers, pressure sewers, vacuum sewers, extended aeration, extended aeration plus filtration, surface discharge and land application. For costing purposes, the least expensive combination of options was selected--small diameter gravity sewers, extended aeration treatment plus filtration and disposal of effluent to surface water. In other parts of the study area not served by small community systems locally funded on-lot systems would be used for treatment and disposal of wastewater.

Alternative 4, Suburban Maryville-Alcoa Interceptor Alternative

This alternative would provide federally funded interceptor sewers to the areas north and west of Alcoa and southwest of Maryville. The cost for this alternative also includes a small community system in the Townsend area which may be necessary during the planning period. The remaining areas proposed for sewer extensions under no federal action would be locally funded as would on-lot systems in the rest of the study area.

Alternative 5, Limited 201 Alternative

This alternative would provide federally funded interceptors to extensive service areas throughout the study area in conformance with the population projections used in this EIS. The remaining portions of the study area would be served by on-lot systems not supported by federal funds.

Alternative 6, Full 201 Alternative

This alternative would provide federally funded interceptors to extensive service areas throughout the study area in conformance with the population projections used in the Blount County 201 Plan. The remaining portions of the study area would be served by on-lot systems not supported by federal funds.

PART C - EVALUATION OF ALTERNATIVES

The alternatives described in Part B were evaluated in terms of cost, operability, implementability and environmental impact. The evaluation of the alternatives with respect to these categories is summarized in Table 1.

Cost

As shown in Table 1, there are significant differences among the alternatives with regard to present worth ($24.4 million to $8.2 million). These figures clearly indicate that the provision of service by on-lot systems is the lowest cost. It is important to note that the provision of a management system adds significantly to the overall cost for on-lot systems alternatives. For service to the entire County, interceptor systems are lower cost than small community systems. However, for a

TABLE 1

ALTERNATIVES EVALUATION SUMMARY

Alternatives	Present Worth Cost (in millions)	Environmental Impacts	Implementability	Operability
1. No Federal Action	$ 8.2	1. Supports land use plan and supports centralized growth. 2. Centralized growth could minimize overall conversion of prime farmland; however, the added capacity from a package treatment plant in Townsend could result in conversion of much of the prime farmland in that area. 3. Secondary impacts of development in Townsend would result in nonpoint source loads to Little River and would strain community services. 4. Would increase wasteloads to Tennessee River. 5. No improvement in adverse impacts from failing on-lot systems.	1. No local agency is staffed or equipped to undertake extensive sewer expansions in the county. 2. Sewer extensions would only be made where developers or homeowners can pay for them.	1. Operation of the Townsend package plant would be very important requiring new operators and treatment engineers. 2. Maintenance of existing on-lot systems would not be improved. 3. Operating requirements of on-lot systems are minimal.
2. On-Lot Systems	13.0	1. Improvement in adverse impacts from failing septic systems. 2. Some areas near Maryville and Alcoa may have lower density than that forecast in land use plan. 3. Lower density developments would increase costs for public services and could increase conversion of prime farmland near the Maryville/Alcoa area. 4. No new surface water discharges would be created.	1. Management agency concept likely to be controversial. 2. Elevated sand mounds not familiar within the study area. 3. Innovative and alternative classification makes this alternative more likely to receive federal funds than the other alternatives.	1. Operation of the Townsend package plant would be very important requiring new operators and treatment engineers. 2. Management agency will improve reliability and efficiency of on-lot systems. 3. Elevated mounds have greater O&M requirements and should be designed and installed by experienced personnel.

TABLE 1 (Continued)

Alternative	Present Worth Cost (in millions)	Environmental Impacts	Implementability	Operability
3. Small Community Systems	$24.4	1. Encourages clustered development; Supports land use plan. 2. Proliferation of surface discharges would affect water quality, aquatic resources, recreation and, perhaps public health. 3. Impacts to Little River would be greatest if surface discharge option were selected. 4. Land application in Karst areas could impact groundwater.	1. Lack of existing water quality or public health problems makes project rank low on state priority list and severely limits chances for EPA funding. 2. State approval need for 35 different disposal sites or discharge points. State policy has discouraged discharge to Little River. 3. User costs would be very high. 4. No existing local agencies are staffed or equipped to assume responsibility for O&M of 35 treatment plants.	1. It is doubtful that sufficient manpower will be available to operate all plants effectively. 2. Very little local experience with land application. 3. Operation of land application systems would be limited by wet and cold periods.
4. Suburban Maryville/ A[illegible]	9.2	1. Supports centralized development. 2. Impacts as discussed for alternative 1 from Townsend package plant. 3. Some increased discharge to Tennessee River.	1. Lack of existing water quality or public health problems makes project rank low on state priority list and severely limits chances for EPA funding. 2. Could be implemented in similar manner as existing county wastewater facilities.	1. Operation of the Townsend package plant would be very important requiring new operators and treatment engineers. 2. Some increased O&M requirements at Maryville WWTP. 3. Small diameter sewers more difficult to inspect and maintain. 4. Added operating requirements from Townsend package plant.

TABLE 1 (Continued)

Alternative	Present Worth Cost (in millions)	Environmental Impacts	Implementability	Operability
5. Limited 201	$13.0	1. Supports land use plan although induced development could occur. 2. Some service areas include prime agricultural lands. 3. Additional surface discharge to Tennessee River. 4. Could induce economic growth especially in the Townsend area. 5. Could lead to increased runoff in Little River and decreased water quality.	1. Lack of existing water quality or public health problems makes project rank low on state priority list and severely limits chances for EPA funding. 2. No local agency is presently staffed or equipped to implement this alternative. 3. Local share of project costs is high.	1. Some potential design and construction problems with Townsend interceptor. 2. Increased O&M requirements at Maryville WWTP. 3. Small diameter gravity sewers are more difficult to inspect and maintain.
6. Full 201	18.2	1. Inducement of growth beyond that forecast in land use plan. 2. Increased runoff to Little River leading to decreased water quality. 3. Development on prime agricultural lands. 4. Strain on other services and facilities. 5. Additional discharge to Tennessee River. 6. Could induce economic growth expecially in the Townsend area.	1. Lack of existing water quality or public health problems makes project rank low on state priority list and severely limits chances for EPA funding.. 2. No local agency is presently staffed or equipped to implement this alternative. 3. Some citizens may object to growth inducement potential. 4. Local share of project costs is very high.	1. Some potential design and construction problems with Townsend interceptor. 2. Increased O&M requirements at Maryville WWTP. 3. Small diameter gravity sewers are more difficult to inspect and maintain.

specific community in a rural area surrounded by sparse development, a single small community system could be less costly than a long interceptor line.

Operability

Operability considerations do not completely eliminate any type of system from consideration in this EIS. The greatest potential problems appear to be related to the small community system alternative. The proper operation and maintenance of 35 separate systems would require highly trained staff and would be very complex.

Implementability

New on-lot systems would require permits from the Blount County Health Department or the new management agency before they could be constructed. Surface discharges and land application sites associated with small community systems would require state permits.

The lack of existing water quality or public health problems causes the conventional projects to rank low on the state priority list and severely limits chances for EPA funding. The on-lot systems alternative qualifies as an innovative and alternative project. This increases its chances for EPA grant funds.

The eligibility of the renovations proposed in the on-lot alternative for federal funding would be dependent upon the local determination of need for and establishment of an on-lot management agency. To establish such a management agency, several new legal authorities would have to be granted by the County Commissioners. The management agency would need a permanent funding source for operation as well as the power to place liens or use other sources to compel compliance with regulations adopted to cover operation and maintenance.

Public acceptance of this concept may be difficult to obtain for two reasons. The first is cost. On-going operating expenses for this agency would have to be raised in some manner from local sources. Also, short term operation and maintenance costs for on-lot systems are likely to increase with more regular inspections and enforcement. Long term reductions in drain field replacements mitigate this impact but are harder to document and sell.

The second public concern results from the need for periodic inspections and enforcement of operation and maintenance standards. In Blount County, the public may not react favorably to a new form of government control and more frequent visits by on-lot inspectors to individual homes.

Environmental Impacts

Studies associated with this EIS have identified some malfunctioning of on-lot systems within the study area. Many of these problems occur only on a seasonal basis and result only in increased soil moisture levels. A few result in surfacing of effluent with accompanying odors and other problems. At this time, however, no significant water quality impacts or associated environmental effects have been seen to result from these failures or any other source. Thus, no future adverse water quality impacts are projected from the no federal action or on-lot alternatives. The major adverse impacts associated with the interceptor alternatives are potential secondary impacts, particularly in the Townsend area. These include impacts from stormwater runoff to the Little River, development on prime agricultural lands and excessive demand for community services and facilities. Selection of the small community systems alternative would result in potential adverse impacts to surface waters.

PART D - DESCRIPTION OF THE PREFERRED ALTERNATIVE

After the systematic evaluation of all alternatives, the use of on-lot systems is selected as the most cost effective and environmentally sound means of wastewater management for Blount County. This approach to wastewater management can be implemented through either the on-lot system alternative (alternative 2) if the local citizenry desires to establish an on-lot management agency or the no federal action alternative (alternative 1) if a decision is made locally not to establish such an agency.

The on-lot alternative would provide for renovation of existing on-lot systems which are malfunctioning and disposal of wastewater from future development using on-lot disposal systems. At this time, the decision is made to provide federal cost-sharing only for the renovation of on-lot systems. If at some future point, development in Townsend reached a level where wastewater disposal needs can not be met using well managed on-lot systems, EPA will review the possibility of funding a small community land application or other system which would provide protection for the Little River.

EPA regulations stipulate that federal funding for on-lot disposal systems may only be approved if a local on-lot management agency is in place to regulate the design, installation, maintenance and operation of these systems. It would be necessary, therefore, for such an agency to be established in Blount County prior to approval of federal funds for on-lot renovations.

On-lot systems could be renovated using a number of different conventional septic tank/soil absorption systems or elevated mound systems. Either approach is considered by EPA to be an innovative and alternative system and, hence, is eligible for funding of 85% of project costs.

It may be appropriate for the responsible local agencies to extend collection sewer lines to specific areas near existing interceptor lines where cost and soil conditions dictate. Costs for such lines would be funded by local sources.

PART E - BASIS FOR DECISION

The EIS has documented no public health or other water quality related problems which would justify selection of any of the interceptor alternatives or the small community system alternative. The current low ranking of this project on the state priority list supports this conclusion. In fact, the stimulation of development which could accompany the construction of sewer lines would actually lead to the decrease in water quality in the Little River through storm water runoff. The continued use of on-lot systems which is presented in alternatives 1 (no federal action) and 2 is the most cost-effective, environmentally sound wastewater management option available. The no federal action alternative is the least costly alternative; however, the additional $4.8 million in present worth of the on-lot system alternative may be justified to promote the renovation of existing spot septic tank failures located throughout the study area. Implementation of this alternative would result in the elimination of existing septic tank failures and odor problems and the establishment of an on-going program that would assure maintenance of high water quality in the future.

EPA's remote sensing study identified 259 surface failures and 1,445 seasonal failures in the study area. Many of these areas can be picked up with the extension of collector lines from the Maryville and Alcoa systems. The problems in the rural areas are so widely dispersed and so limited in extent that the costs necessary to provide centralized service to these areas would not be justified; and renovations to these systems could be provided relatively inexpensively. In addition, the offer of federal funds for renovations contingent upon the establishment of a management system would encourage the establishment of a regular schedule for pumping out septic tanks, encourage improved siting and maintenance practices and provide a system for renovation of systems which fail in the future. Thus, this alternative would improve wastewater management practices throughout Blount County both now and in the future. The residents of Blount County and their elected local officials must determine if the long-term elimination of potential public health and water quality problems justifies the creation of the management agency.

CHAPTER 1

CHAPTER I

PURPOSE AND NEED FOR ACTION

The Blount County, Tennessee EIS is being prepared to address the provision of wastewater transmission, treatment and disposal facilities for the Blount County 201 Facilities Planning Area. Phase I of the Facilities Plan which provides facilities for the cities of Maryville and Alcoa has been provided funds for construction. The focus of the EIS is on wastewater facilities proposed in the 201 Plan for Phase II funding.

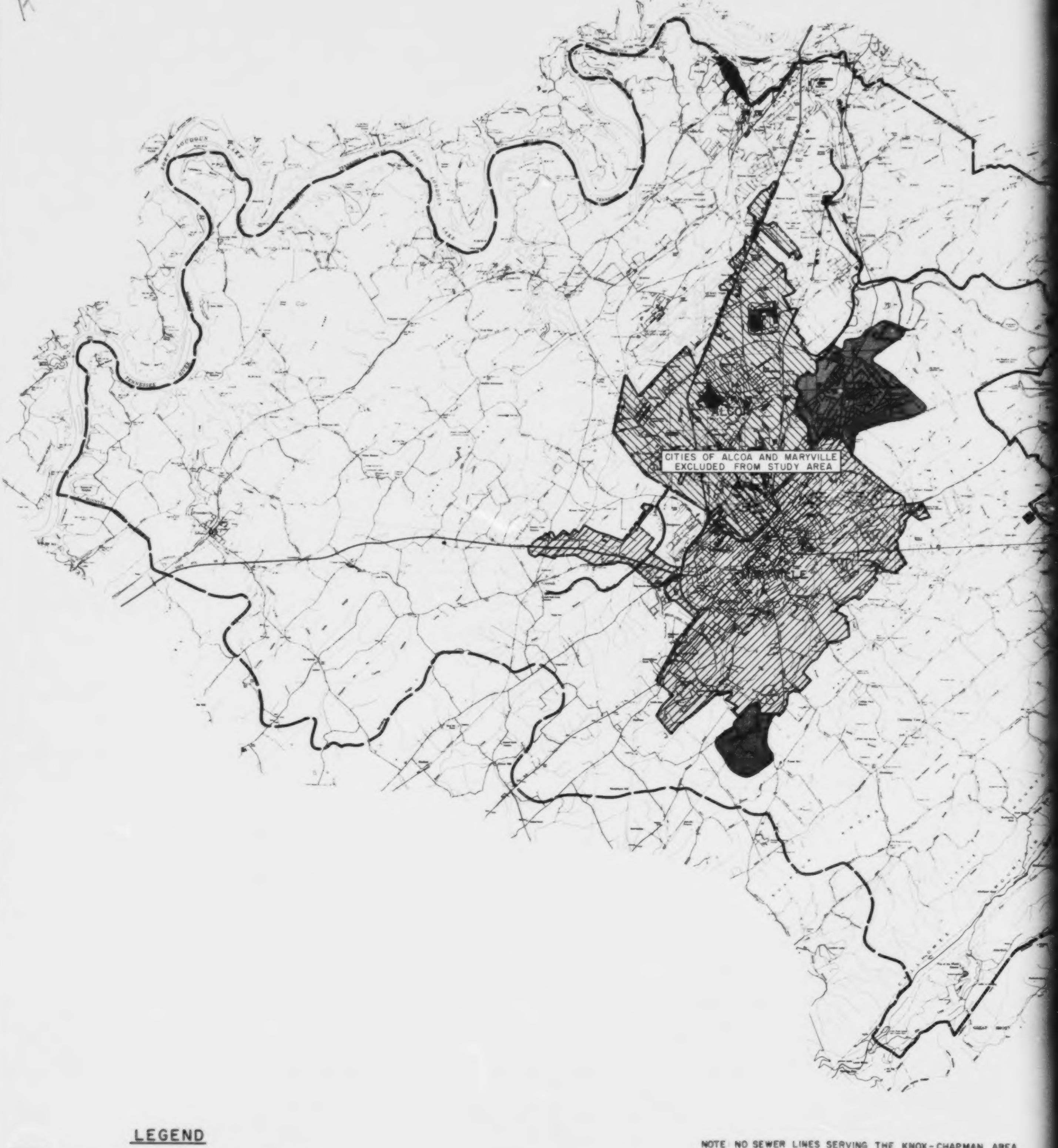
Blount County is located in eastern Tennessee just south of Knoxville and immediately adjacent to the Great Smoky Mountains National Park. The study area for the EIS includes the northern half of Blount County with the exclusion of the cities of Maryville and Alcoa as shown on Figure 1.

Blount County is heavily endowed with numerous natural resources. Among these is the Little River which flows through the eastern portion of the study area. The Little River is very significant as a scenic area, a surface water recreational resource and the primary water supply source for Blount County.

The Great Smoky Mountains National Park encompasses the mountainous areas of four adjacent states--Georgia, North Carolina, South Carolina and Tennessee. The northern portion of the park lies within three Tennessee counties including Blount County. In Blount County, the park is highly accessible by way of Tennessee Route 73 which runs southeast from Maryville through Townsend. The park is located approximately 18 miles southeast of Maryville and within two miles of Townsend.

Centralized wastewater transmission systems are operated within Maryville, Alcoa and adjacent areas of Blount County by the Maryville Utilities Board (MUB), the City of Alcoa and the Blount County Utilities Board (BCUB) respectively. The existing interceptor sewer lines within the EIS study area are located on Figure 1-1. All centralized wastewater treatment and disposal within Blount County is conducted by the MUB at their treatment plant with surface discharge to the Tennessee River. A

A


CITIES OF ALCOA AND MARYVILLE
EXCLUDED FROM STUDY AREA
ALCOA
MARYVILLE
FORT LOUDOUN LAKE
TENNESSEE RIVER

LEGEND

▨ AREAS SERVED BY ALCOA OR MARYVILLE

■ EXISTING PUMPING STATION

— EXISTING SEWER LINE

NOTE: NO SEWER LINES SERVING THE KNOX-CHAPMAN AREA OR THE COLONIAL NURSING HOME/FOREST HILLS AREA HAVE BEEN INCLUDED. SUCH SEWER LINES MAY OR MAY NOT BE IN PLACE.

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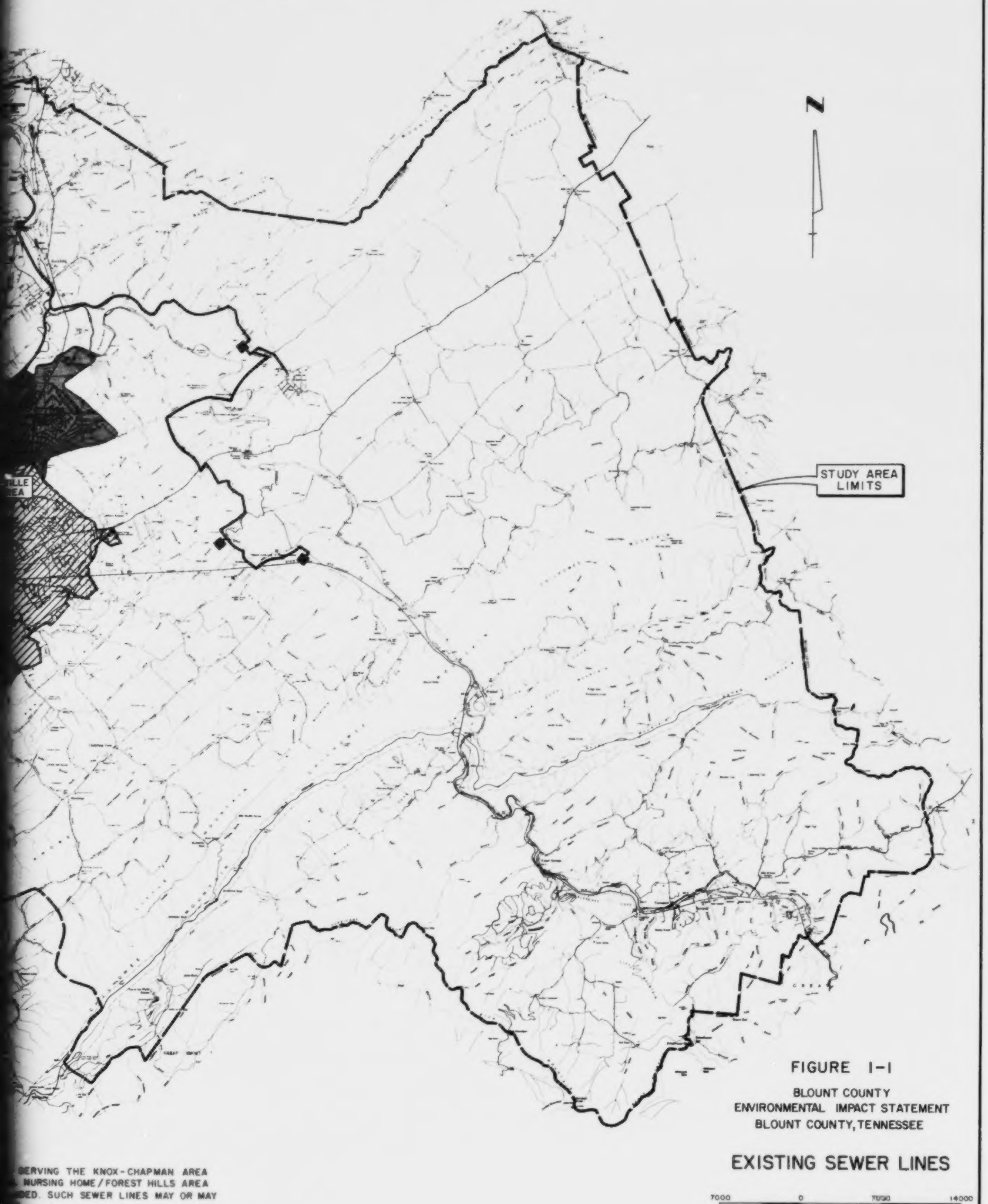
N
STUDY AREA LIMITS
LLE
EA
7000
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14000
SCALE IN FEET

FIGURE 1-1

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

EXISTING SEWER LINES

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

SERVING THE KNOX-CHAPMAN AREA
NURSING HOME/FOREST HILLS AREA
DED. SUCH SEWER LINES MAY OR MAY

small number of independently operated package plants also exists. Most of the rural area is served by on-lot septic tank systems. Studies conducted as part of this EIS have identified 259 surface failures and 1,445 seasonal failures occurring from these on-lot systems.

Under the provisions of Section 201 of the Clean Water Act, Public Law 92-500, the local applicants prepared a 201 Wastewater Facilities Plan. This report provided a plan for wastewater management for a 20 year period. The plan proposed to construct a series of extensive interceptor sewer lines throughout the County including service to many existing rural areas.

This plan came under extensive scrutiny in the local community because of the perception that growth would be encouraged in environmentally sensitive areas. The most controversy centered on the Townsend area, particularly the Little River, prime agricultural lands and the existing life style of the area. The 201 Plan was based upon the assumption that extensive resort-oriented growth would soon occur in the Townsend area.

Because of the controversy surrounding growth in the Townsend area and potential impacts to environmentally sensitive areas, EPA decided to prepare an EIS to review and evaluate wastewater management facilities proposed to serve Blount County. Subsequently, a Notice of Intent was issued by the EPA Regional Administrator, November 14, 1979.

A Plan of Study for the EIS which identified the following issues to be addressed was then prepared:

1. The extent of current water quality problems in the Little River and its tributaries.
2. The extent of current on-lot system failures.
3. Appropriate population projections for the study area.
4. Indirect growth impacts of man-made activities on all aspects of the human environment such as removal of prime agricultural lands.

5. The protection of natural resources such as the Little River.
6. Direct impacts of construction and operation on and close to facility sites.

The results of this work are presented in the text of this EIS.

CHAPTER 2

CHAPTER II

ALTERNATIVES DEVELOPMENT AND EVALUATION

PART A - INTRODUCTION

The purpose of this chapter is to provide a systematic development of all reasonable wastewater management alternatives which will adequately handle the wastewater flows projected for the year 2000 from the study area. These alternatives are then evaluated and compared based upon cost, operability and implementability so that critical differences between them can be identified. An environmental evaluation of the alternatives is presented in Chapter III of this EIS.

A wide range of wastewater management alternatives was considered for the study area. These methods generally included on-lot systems, small community systems with both discharge to surface waters and land application and regionalized systems with interceptor sewer lines leading to the existing wastewater treatment plant for treatment and disposal into the Tennessee River. Non-structural wastewater considerations discussed include water conservation, wastewater management districts, optimum use of existing facilities and land use controls.

A no federal action alternative is also presented for the study area. This alternative represents the option to provide no EPA funding toward the construction of expanded wastewater treatment capacity. Because local and/or private funding of wastewater facilities is not precluded under this alternative, no federal action does not necessarily limit growth in Blount County.

PART B - POPULATION AND WASTEWATER FLOW PROJECTIONS

The wastewater flows which will be generated in the year 2000 are a function of the population projected for Blount County and the per capita water use. Both of these factors will be discussed below.

1. Population Projections and Disaggregation

Various existing sources of population information were identified and evaluated for use in the EIS. Because of different deficiencies or problems identified with these sources, a new projection and disaggregation effort was undertaken to replace projections presented in the 201 Wastewater Facilities Plan.

Population in the study area was disaggregated into 44 districts based mainly on drainage patterns but also reflecting political boundaries. Present (1980) populations for each district were developed and then projected to 2000 by five year increments. Table II-1 presents the present and projected populations for the 44 districts whose boundaries are shown on Figure 3-1.

In addition to resident population, a projection was also made for the number of overnight accommodations (motel rooms and campsites) to exist in Townsend by the year 2000. This analysis concluded that in 2000 there will be about 1,500 overnight accommodations in Townsend. During peak tourist periods, the accommodations can be assumed to be filled to capacity with three persons per accommodation.

2. Wastewater Flows

Sizes of wastewater facilities are planned in this EIS based on flow projections for the year 2000. EPA regulations (dated September 28, 1978) state that the length of time on which to base the staged implementation of interceptors is 20 years. Staging periods longer than 20 years could be fundable only if larger pipe sizes, associated with larger staging periods, could reduce impacts. Such larger pipe sizes are not considered advantageous because they could encourage residential development.

Population and accommodation projections are utilized as two types of information needed to project wastewater flows. In addition, water demand is also important.

Based on average 1980 water demands within the Friendsville, South Blount and Tuckaleechee Utility Districts (EIS Environmental Inventory Task Report 1981), and assuming wastewater flows are 70 percent of water demands (Metcalf and Eddy, 1972), an average wastewater flow of 46 gallons per person (capita) per day (gpcd) is obtained. For projections of future wastewater flows, federal regulations require that flows per person can not be projected to increase in the future (Federal Register, 1980). There are no reasons to project increased water use at toilets, showers and faucets. Therefore, the 46 gpcd is utilized in this EIS to project wastewater flows generated at homes. The Blount County 201 Wastewater Facilities Plan utilized flow projections for the study area outside the cities of Alcoa and Maryville based on 40.5 gpcd, 3.3 persons per household and 200 gallons of infiltration and inflow per day per inch of interceptor diameter per mile of interceptor length. 20 percent of additional infiltration and inflow (I&I) was also added to account for I&I to smaller sewer lines.

Wastewater facilities are sized based on a number of factors as follows:

For on-lot systems: number of persons per household, soil characteristics and state regulations regarding soil absorption area.

For small community sewers: 400 gpcd as a minimum design flow (ASCE, 1974). Small gravity sewers are usually designed to flow half full at peak flow (ASCE, 1974 and U. S. EPA Region IV criteria). 200 gallons per day (gpd)/inch of diameter per mile of length are used to account for I&I to gravity sewers. A minimum wastewater velocity must also be met.

For interceptor sewers: Peak and minimum flows are estimated based on population projections (ASCE, 1974). At Townsend motels and campgrounds, 150 gpd per day per accommodation is used. For businesses, 30 gallons per employee per day are allocated for sanitary wastewater flows. Within areas adjacent to the cities of Alcoa and Maryville, 10 percent of increases in residential wastewater flow projected between 1980 and 2000 are allocated for water-using industries. Based on U. S. EPA Region IV design criteria, all gravity sewer lines are designed to flow half full at peak flows. If wastewater velocities are to be consistently less than two (2) feet per second, the pipes may need to be flushed regularly.

For small community wastewater treatment plants: Maximum daily flows projected for the year 2000 to enter each alternative treatment plant are design flows.

For wastewater disposal at small communities: Again, maximum daily flows are utilized. Thirty (30) days of storage for year 2000 average flows are provided for wet periods in association with land disposal.

Hence, flow projections will vary depending upon the wastewater facility being considered. Resulting sizes of various facilities are presented in the descriptions of the alternatives in Part E of this chapter.

PART C - IDENTIFICATION OF AVAILABLE STRUCTURAL ALTERNATIVES

This section identified generic types of alternatives and describes how they would be applied to Blount County. Within this section, these alternatives are not developed in full detail but descriptions are sufficiently detailed for a first level comparison.

1. On-Lot Treatment and Disposal

Tables II-1 and II-2 describe treatment and land disposal system characteristics respectively.

Conventional septic tank-absorption field systems are a viable wastewater treatment and disposal alternative for low density residential and commercial areas having suitable soil permeabilities, slopes, depth to the water table, depth to bedrock and climate.

TABLE II-1

ADVANTAGES AND DISADVANTAGES OF VARIOUS ON-LOT AND SMALL COMMUNITY TREATMENT SYSTEMS

Treatment Systems

System	Approximate Cost (1977 Dollars)	Operation and Maintenance	Energy Use	Reliability/ Implementability
Septic Tank	$600 per home (tank only) plus $30-50 each time septage is pumped.	Inspection and pumping every 2 to 5 years.	None	Very reliable with periodic inspection and maintenance. Approx. 50 percent removal of five-day BOD. Commonly used throughout the U. S. and Tennessee. Disposal of septage is important.
Filter	$5 to $15 per square foot of surface area plus $1 per square foot per year.	Pump or siphon may be needed to dose filter or recycle effluent. Top 2 to 4 inches of sand require periodic replacement. Filter may need to be rested occasionally.	Low, possibly for pumping.	Pretreatment is usually provided by septic tanks. Effluent usually has less than 10 mg/l of five-day BOD and SS. Filter sizes limit use to on-site and small community locations because of land and labor requirements. High seasonal ground water table can be a problem.
Extended Aeration	$1,500 to $2,500 per 1,000 gal. for household unit, plus $60 to $120 per year for labor, plus power costs (5 to 10 kilowatt-hours per day).	Semi-skilled person needed for frequent inspection and operation.	High, aeration and pumping required.	75 to 90 percent removal of five-day BOD, suspended solids and pathogens. Poor maintenance can cause odors. Disposal of sludge is important.
Lagoon	$0.30 to $0.50 per 1,000 gal. of wastewater treated per year.	Variable depending on whether effluent is recirculated, chemicals are added, plants are harvested or ecological communities within a pond are controlled.	Possibly for pumping wastewater to the pond or if ponds are aerated.	Greater than 90 percent removal of five-day BOD and suspended solids is possible but unlikely. Land requirements and potential odors are limitations to usage. For treatment, lagoons are sensitive to climate conditions.
Rotating Biodisk	Not Given	Little maintenance.	Low power requirements.	Susceptible to climate and damage unless housed.

TABLE II-2

ADVANTAGES AND DISADVANTAGES OF VARIOUS ON-LOT AND SMALL COMMUNITY LAND DISPOSAL SYSTEMS

Disposal Systems

System	Approximate Cost (1977 Dollars)	Operation and Maintenance	Energy Use	Reliability/ Implementability
Soil Absorption	$1.15 to $1.50 per square foot for construction. $600 per home for only pump and tank, if pump is used.	Little. Periodic resting of system prolongs life. Pump maintenance is needed if pump is used.	Low. Pumping may be used to spread effluent evenly onto absorption field and improve performance.	Restricted to areas with deep and moderatel to well-drained soils. Use during wet season is further restricted. Additional treat ment takes place as effluent percolates through the soil.
Sand Mound	$0.75 to $3.00 per square foot of basal area for construction of mound and pumping chamber. Approx. cost is $2,000 per home installation.	Pump or siphon maintenance and periodic replacement of top two to four inches of sand.	Moderate if pump is used.	Use is not as restricted as use of soil absorption systems. Additional treatment takes place. Principal application has been for single homes and businesses. Size of a system is only limited by site conditions.
Irrigation	Costs per unit volume of treated effluent are higher than for larger, municipal flows.	Variable depending on type of irrigation system.	Variable depending on type of irrigation system.	Restricted to areas with deep and moderatel to well-drained soils. Use during wet season is further restricted. Additional treat ment takes place as effluent percolates. Irrigation systems are used by small communities more than individual residences.
Lagoons	$0.30 to $0.50 per 1,000 gal. of wastewater disposed.	Variable.	Possible for pumping wastewater to the pond.	Land requirements are the biggest limitation. Odors and pests can be a problem particularly if wastewater is not pretreated
Evapotranspiration Bed	$1.00 to $1.50 per square foot of bed area for construction.	Periodic removal of bed deposits.	Possibly for pumping wastewater to the bed.	Particularly suitable in areas where soil percolation is unsuitable and evapotranspiration rates are high. Size of a system is limited only by site conditions. Less suitable during rainy months.

The area required for this type of system depends on both the daily wastewater flows and specific site conditions which affect a soil's ability to safely absorb, treat and dispose of septic tank effluent. Minimum area is needed when a site contains fine, permeable soils on a nearly level to gently sloping surface not subject to flooding. Area requirements increase as slopes increase and as soil depth, depth to the water table or soil permeability decrease. In addition, sufficient suitable area should be available for the installation of a replacement system in the event the initial system fails.

Sites are generally suitable for the installation of a conventional absorption field if (a) soil layers are relatively free of impermeable layers to a depth of at least six feet, (b) permanent groundwater levels are at least six feet below the surface, (c) the temporary high water table during the wettest portion of the year is at least three feet below the surface, (d) the percolation rate is less than 15 minutes per inch, (e) slopes do not exceed 25 percent and (f) the land surface is geologically stable. The size of an absorption field can then be engineered at suitable sites based on percolation rate, precipitation and soil characteristics, evapotranspiration rates and other factors.

The U. S. Department of Agriculture (USDA), Soil Conservation Service has described the type and degree of limitation for septic tank absorption fields characteristic of each soil series within Blount County. As Table II-3 shows, there are soils in the study area which are without severe limitations for conventional septic systems. Where soils do have limitations these are often a result of shallow depths to the water table and high flooding potential. Specific percolation rates are not associated with the slight, moderate, severe and very severe limitations categories. Many limitations can be overcome by detailed engineering design and site modifications listed in Table II-4.

Alternate systems can extend the range of soil conditions where on-lot systems can be utilized. Areas having slowly-permeable soils can be utilized for subsurface disposal if at least the top two feet of soil are permeable and free of groundwater. Elevated absorption beds become more

TABLE II-3

LIMITATIONS WITH INSTALLING AND UTILIZING BOTH ON-LOT WASTEWATER SYSTEMS AND SMALL COMMUNITY LAND DISPOSAL SYSTEMS

Soils with No Significant Restrictions	Name of Soil Series	Comments
For limiting soil absorption system performance	Jefferson	A conventional on-lot system is suitable to install and utilize
Soils Rated Moderate		
Most Restrictive Feature 1) Slow Permeability	Alcoa, Allen, Christian, Cumberland, Decatur, Dewey, Dunmore, Emory*, Etowah, Fullerton*, Hermitage, Minvale, Sequatchie, Waynesboro, Tellico*	Soils with permeabilities of 100 to 30 minutes per inch. Installation in these soils may require additional absorption area to compensate for slower permeabilities. Another possibility is the use of an elevated sand mound or sub-surface sand filter at each site.
2) Depth to Bedrock	Hayter, Tellico*, Emory*	Permeable shallow soils exist. An elevated sand mound or sub-surface sand filter is suitable for construction on sites with a slope of 12 percent or less.
3) Seasonal High Water Table	Fullerton*, Neubert	Mottling occurs at a depth of approximately five feet. An elevated sand mound is suitable for construction on sites with a slope of 12 percent or less.
Soils Rated Severe		
Most Restrictive Feature 1) Slow Permeability	Colbert, Farragut, Leadvale, Muse, Pace, Talbott	An elevated sand mound or sub-surface sand filter may be suitable for construction at sites with a slope of 12 percent or less.

TABLE II-3 (Continued)

Soils Rated Severe (Cont.)		
2) Depth to Bedrock	Dandridge, Lehew, Litz, Montevallo, Ramsey, Rockland, Sequoia, Teas	These soils occur on steep slopes and ridges. Slopes range up to 70 percent. Limitations due to depth to bedrock and steep slopes would be most difficult to overcome.
3) Seasonal High Water Table	Barbourville, Greendale, Hamblen, Lindside, Melvin, Prader, Staser, Whitesburg, Whitewell	These soils occur on bottom lands, along drainage ways and floodplains. These soils are periodically subject to flooding. Major expensive site modifications would be needed to overcome problems associated with wetness.

*Soils with more than one restrictive feature.

Notes: 1. The comments imply that installed systems are designed, installed and maintained properly according to existing regulations.
2. Information presented in this table is based on detailed soil series information provided to Gannett Fleming Corddry and Carpenter, Inc. from the U.S.D.A., Soil Conservation Service in Knoxville, Tennessee.

TABLE II-4

SITE MODIFICATION METHODS FOR LAND TREATMENT AND DISPOSAL WHICH CAN BE IMPLEMENTED IN BLOUNT COUNTY TO OVERCOME RESTRICTIVE FEATURES

RESTRICTIVE FEATURE	METHODS TO OVERCOME LIMITATION
Depth to bedrock less than 6 feet	1) Construct a sand mound to provide an additional 1 to 3 feet of fine textured soil between the restrictive horizons and the disposal pipes or bed. 2) Provide additional treatment, such as extended aeration or filtration, prior to disposal.
Depth to seasonal high water table less than 6 feet	1) Construct a sand mound to provide an additional 1 to 3 feet of fine textured soil between the restrictive horizons and the disposal pipes or bed. 2) Drain a site in order to provide a greater depth of unsaturated soil during wet periods.
Soil permeability less than 2.0 inches per hour	1) Design a system with a larger absorption area utilizing pressure dosing if necessary, to allow wastewater to be spread evenly over a disposal area. 2) Excavate the restrictive layer if such excavation is economical. 3) Utilize two different absorption fields in an alternative sequence. 4) Utilize an elevated sand mound.
Soil permeability greater than 6.0 inches per hour	1) Provide additional treatment, such as extended aeration or filtration, prior to disposal. 2) Provide sand to line trenches and bed. 3) Utilize an elevated sand mound.

NOTE: For all locations, depth to bedrock, depth to seasonal high water table and soil permeability should be measured prior to installing any type of land disposal system.

difficult to construct on slopes greater than six percent and should not be built at all on slopes greater than 12 percent. In general, all on-lot systems should only be constructed in areas that are well drained and not subject to flooding. Installation in depressions or low-lying areas such as the Little River floodplain should be avoided. Additionally, minimum isolation distances between systems with respect to the proximity to buildings and wells must be provided.

When soils absorb wastewater very rapidly, filtration by soil bacteria to further treat wastewater may not occur. Similarly, if the subsoils are relatively impermeable or only slowly permeable, partially treated wastewater may pond at the surface possibly causing an immediate health hazard.

On-lot treatment and disposal systems have the following advantages and disadvantages:

Advantages:

- Operation and maintenance requirements are relatively low.
- Interceptor and lateral pipelines are not needed.
- Discharges of wastewater to a river or stream are avoided.

Disadvantages:

- Minimum residential lot sizes of approximately one-third of one acre are required.
- Site conditions may make necessary the use of site modifications such as sand mounds. Some sites may even be totally unusable.
- Groundwater quality can be impaired.
- A large number of systems could need to be inspected and maintained.

- Groundwater quality can be impaired.
- Wells may be needed for the purpose of monitoring groundwater quality.

2. Wastewater Transmission Systems

Small Community Sewers

Gravity sewers are wastewater pipelines which rely predominantly on gravitational forces to transport wastewater. Pressure sewers use pumps located at individual homes and businesses which provide energy to transport wastewater. These pumps can be either septic tank effluent pumps (STEP) or grinder pumps (GP), depending upon if a septic tank is being utilized at each home or business. Vacuum sewers are characterized by vacuum valves, tanks and collection stations utilized to create vacuums which provide energy.

The use of a gravity system for small communities may be prohibitive because of high construction costs. Generally, the construction costs of a gravity-type collection system can be 60 to 80 percent higher than construction costs for pressure or vacuum systems in a small community. Reasons for this include larger pipe sizes and deeper pipe trenches. Pressure and vacuum sewers need only to be placed below the frostline or at depths where surface activities will have no effect. Also, in areas where pump stations are needed, construction and operation and maintenance (O&M) costs will increase accordingly. Infiltration rates must be taken into account when designing a gravity collection system.

Although construction costs are high for a gravity system the operation and maintenance costs of these lines are very low. These low operation and maintenance costs are the primary reason a gravity collection system is generally used in newly developing areas.

Gravity systems can be intentionally designed with a small pipe diameter in order to have higher wastewater velocities and not allow peak flows to be as large as if the pipeline had a larger diameter. These small diameter gravity sewers which transport septic tank effluent have been installed in Australia and, to a lesser extent, in the United States. Generally, these sewers have a minimum pipe diameter of four inches compared to an eight inch minimum diameter for conventional gravity sewers. Small diameter gravity sewers and conventional gravity sewers would both be designed to flow half full at peak, year 2000 flows. Achieving wastewater velocities of at least two feet per second can be less of a concern with small diameter sewers than with conventional gravity sewers transporting the same amount of flow.

The advantages and disadvantages of small diameter sewers compared to conventional gravity sewers are shown below.

Advantages:

- Capital costs are lower.
- Less land is affected during sewer installation.
- Distances between manholes can be greater.

Disadvantages:

- Design parameters are undergoing improvements.
- Infiltration and inflow can consume a larger portion of allowable flows.

With small diameter gravity sewers, fewer homes can be connected to sewer lines which reduces the potential for future development to be served. In other words, the larger diameter sewers with eight inches as a minimum diameter have the potential for more excess capacity to be available than if small diameter gravity sewers are installed.

Pressurized systems have some disadvantages. Due to the elimination of infiltration/inflow, the wastewater may be more concentrated, especially with the grinder pump system. Secondly, the wastewaters entering a plant may also be devoid of oxygen which could create odors due to hydrogen sulfide. Some form of pretreatment within the collection system therefore may need to take place. If a combination pressure and gravity collection system is used, pretreatment at the point of entry from the pressure system to the gravity system may be needed. Thirdly, operation and maintenance costs are higher for a pressurized system than for a gravity system. This cost is related to the use of mechanical equipment at each point of entry into the collection system. Finally, increased power costs due to the GP and STEP units need to be considered. Because gravity systems do not require energy use at the home, higher energy usage must be considered a disadvantage for homeowners connected to pressure systems.

Gravity interceptors can be utilized within Blount County whenever favorable topography can be utilized which allows gravitational forces to transport wastewater. Portions of a gravity sewer system can also include force mains with wastewater pumped against gravitational forces.

Advantages and disadvantages associated with gravity collection systems are as follows:

Advantages:

- Pumping may not be necessary.
- Low O&M costs.

Disadvantages:

- High construction costs.
- Deep excavation may be necessary.
- Pump stations may be needed in hilly or flat area (high construction and O&M costs).
- High I&I.

An advantage of a gravity collection system over a pressure or vacuum system is that there may be little, if any, need for mechanical equipment (such as pumps) within the system. For this reason, O&M costs for gravity systems are much less than for the mechanically dependent pressure and vacuum systems. Another advantage of a gravity system is that broken pipes may not need to be immediately repaired depending on the effects the breaks have on flow and the environment.

Pressure sewer systems have a number of advantages and disadvantages over the conventional gravity sewer system as listed below.

Advantages:

- Lower collection system construction costs.
- Elimination of I&I.
- Suitable in areas where there is solid rock close to the surface which precludes deep trenches for gravity collection systems.
- Ease of sewer installation.

Disadvantages:

- Higher waste concentrations.
- Presence of hydrogen sulfide odors at a wastewater treatment plant.
- Higher O&M costs particularly for pumps and leak detection.
- Greater use of energy.

A vacuum sewer system has a number of advantages and disadvantages when compared to the conventional gravity sewer system. Most of these are similar to those of a pressure system.

Advantages:

- Lower collection system construction costs.
- Less excavation during sewer installation.
- Reduced water consumption if vacuum toilets are utilized.

Disadvantages:

- Component reliability.

- High O&M costs.
- Insufficient prototypes and field testing within Tennessee.
- Possible greater use of energy.

As in a pressure system, a vacuum collection system needs to be placed just below the frost line or at depths that are unaffected by surface activities. Construction costs will, therefore, be lower than for a conventional gravity system but higher than that of a pressure system because pockets need to be constructed in order for the vacuum system to work.

Infiltration and inflow will be much lower than for the gravity-type systems, but some infiltration and inflow will occur due to the vacuum which is maintained within the collection system.

Another advantage of a vacuum system is that vacuum toilets can be used in the home. With the use of vacuum toilets the amount of water used for toilet flushing can be reduced by 90 percent. On the average 40 to 45 percent of the water used in the home is for toilet flushing. This water conservation benefit of a vacuum collection system can be particularly attractive in areas where vast reserves of low-cost water are not available.

If vacuum toilets are used, concentrations of wastewater entering a treatment plant will be even higher than concentrations from a pressure system. Design of treatment plants for vacuum collection systems will need to take into account these higher concentrations and lower per capita flows of wastewater.

Vacuum sewers also have some disadvantages. Infiltration and inflow may become a problem when breaks in pipelines occur. If the collection lines are close to the surface, air and/or water may be sucked into the collection lines, possibly causing the collection system to cease functioning upstream from the break.

Operation and maintenance costs for the vacuum system could be the highest of the three types of collection systems. Much of these costs may be due to a scarcity in the number of vacuum systems. Thus far, there have been insufficient prototypes and field testing to be able to estimate such costs with any certainty. On the other hand, a few small vacuum sewer systems are either already in existence or being planned within the central portion of Tennessee.

However, despite problems and high operation and maintenance costs, a vacuum system in Mathews, VA, provided a total annual average savings of over $16,000 when compared to estimated total costs for a gravity system. Cost savings are also projected with vacuum sewers designed for a portion of Queen Anne's County along Maryland's Eastern Shore (Hassett and Starnes, January 1981).

3. Wastewater Treatment Facilities

The choice between providing secondary wastewater treatment or more advanced wastewater treatment depends primarily upon impacts of the wastewater once it is discharged to the environment. This choice is the same as one made for municipal treatment plants. On the other hand, the choice between various secondary treatment processes depends primarily upon cost economy which differs with wastewater flow rates and upon operation requirements.

A proposed location for a wastewater treatment plant is a second consideration. A treatment plant should be located away from residential areas in a direction not in line with strong, prevailing winds. For Blount County, small community treatment plants would be located northwest or southeast of residences to avoid odor concerns as much as possible.

4. Wastewater Disposal Options

Surface Water Discharges

Currently within Blount County, nearly all wastewater is disposed via discharges to surface waters. Surface runoff, failures of existing on-lot systems and precipitation can also adversely affect the water quality of surface waters.

The Little River drainage area is particularly sensitive to receiving pollutant loadings. The river itself is a water supply source and it has relatively low flows during the fall which reduce the river's capacity to dilute pollutants. The river also provides habitat for species which are federally protected or proposed for federal protection. Any discharges entering the river downstream of water supply intakes would not adversely impact drinking water quality within Blount County.

Shallow well injection appears to be more attractive in coastal areas where the underlying water table and aquifer have experienced salinity intrusion rather than in areas that have not experienced salinity intrusion. Conceivably, any wastewater injected into the water table could be reused later for lawn irrigation or other non-potable water usages. However, public and private water supplies could become contaminated as a result of shallow-well injection.

Deep-well injection has received some favorable review because it removes the potential for surface water pollution while still being implementable during rainy periods. Its use is considered to be in the experimental stage. In addition, concerns about the effects of wastewater injected into deep wells are evident, particularly if wastewater is injected into non-saline geologic formations.

Land Disposal Options

Land disposal for small communities has the same soil, topography and other environmental and implementability considerations as on-lot disposal systems.

Land disposal of wastewater would reduce, but not avoid, adverse impacts on water supply and on Blount County rivers or streams adjacent to a land disposal site. Wastewater sprayed or released onto land would be further treated by soil particles. However, most of the wastewater would eventually reach groundwater supplies or migrate laterally to a nearby river or stream.

With rapid infiltration, less treatment is provided by soil particles and soil bacteria because infiltration rates are higher than for slow rate land application or overland flow. Often, therefore, if secondary treatment followed by slow rate land application is acceptable, modified secondary treatment is provided if rapid infiltration is to be utilized.

While disposal via surface water discharge is relatively easy to design and implement, land disposal alternatives require more specific design criteria and the selection of sites with specific, favorable characteristics. Tables II-5 and II-6 summarize these design criteria and site characteristics respectively. The rapid infiltration alternative requires smaller amounts of land, but site characteristics need to be more favorable than for other land disposal alternatives. Table II-7 presents quality characteristics for effluent once the wastewater has infiltrated through soils. Quality can be acceptable assuming the treatment and disposal facilities are properly operated and maintained. Nitrogen removals are generally poor, even with proper operation and maintenance and there are some uncertainties about the treatability of organic compounds and toxic substances. Treatment removal efficiencies do vary for different types of soils.

In summary, land disposal at small communities has the following advantages and disadvantages.

Advantages:

- Interceptor pipelines are not needed.
- Discharges of wastewater to a river or stream are avoided.
- The soil which is receiving treated wastewater usually provides further treatment.

TABLE II-5

COMPARISON OF DESIGN FEATURES FOR LAND APPLICATION PROCESSES

Feature	Slow Rate	Rapid Infiltration	Overland Flow
Application Technique	Sprinkler or surface[a]	Usually surface	Sprinkler or surface
Annual Application Rate, ft.	2 to 20	20 to 560	10 to 70
Typical Weekly Application Rate, in.	0.5 to 4	4 to 120	2.5 to 6[b] 6 to 16[c]
Field Area Required, Acres[d]	56 to 560	2 to 56	16 to 110
Minimum Preapplication Treatment Provided	Primary sedimentation[e]	Primary sedimentation	Screening and grit removal
Disposition of Applied Wastewater	Evapotranspiration and percolation	Mainly Percolation	Surface runoff and evapotranspiration with some percolation
Need for Vegetation	Required	Optional	Required

[a] Includes ridge-and-furrow and border-strip flooding.
[b] Range for application of screened wastewater.
[c] Range for application of lagoon and secondary effluent.
[d] Field area in acres, not including buffer area, roads or ditches for 1 mgd flow.
[e] Depends on the use of the effluent and the type of crop.

SOURCE: U. S. Environmental Protection Agency, 1977, Process Design Manual for Land Application of Municipal Wastewater

TABLE II-6

COMPARISON OF SITE CHARACTERISTICS FOR LAND APPLICATION PROCESSES

Characteristics	PRINCIPAL PROCESSES		
	Slow Rate	Rapid Infiltration	Overland Flow
Slope	Less than 20% on cultivated land; Less than 40% on non-cultivated land	Not critical; excessive slopes require much earthwork	Finish slopes 2 to 8%
Soil permeability	Moderately slow to moderately rapid	Rapid (sands, loamy sands)	Slow (clays, silts and soils with impermeable barriers)
Depth to groundwater	2 to 3 ft (Minimum)	10 ft. (lesser depths are acceptable where underdrainage is provided)	Not critical
Climatic restrictions	Storage often needed for cold weather and precipitation periods	None (possibly modify operation in cold weather)	Storage often needed for cold weather periods

1 ft. = 0.305 m

SOURCE: Process Design Manual for Land Treatment of Municipal Wastewater, U. S. Environmental Protection Agency, October 1977.

TABLE II-7

EXPECTED QUALITY OF TREATED WATER RESULTING FROM LAND APPLICATION
mg/L

Constituent	Slow Rate[a]		Rapid Infiltration[b]		Overland Flow[c]	
	Average	Maximum	Average	Maximum	Average	Maximum
BOD	<2	<5	2	< 5	10	<15
Suspended	<1	<5	2	< 5	10	<20
Ammonia nitrogen as N	<0.5	<2	0.5	< 2	0.8	< 2
Total nitrogen as N	3	<8	10	<20	3	< 5
Total phosphorus as P	<0.1	<0.3	1	< 5	4	< 6

[a] Percolation of primary or secondary effluent through 5 ft. (1.5 m) of soil.
[b] Percolation of primary or secondary effluent through 15 ft. (4.5 m) of soil.
[c] Runoff of comminuted municipal wastewater over about 150 ft. (45 m) of slope.

SOURCE: Process Design Manual for Land Treatment of Municipal Wastewater, U. S. Environmental Protection Agency, October 1977.

Disadvantages:

- Large areas of often developable land are needed for the purpose of wastewater disposal.
- Modifications to the site such as filling or draining may be necessary.

5. Sludge Treatment Disposal Options

For small community treatment plants within Blount County, new sludge disposal needs would be created. Wherever any treatment process is utilized which provides large amounts of time for treatment of a volume of wastewater, sludge management requirements are reduced.

Available agricultural lands within Blount County could be used for sludge disposal. For each alternative, the sludge can be utilized as a source of nutrients for crop production or for lawns and gardens as long as levels of metals and man-made organic compounds are considered within safe limits. Usually as long as land is economically available for liquid sludge disposal, landspreading and landfilling are far less expensive and utilize less energy than either composting or incineration. If a favorable market for composted material can be identified costs for composting would be more attractive. However, transportation costs and unforeseen costs resulting from composting being an innovative technology strongly affect this alternative's final costs.

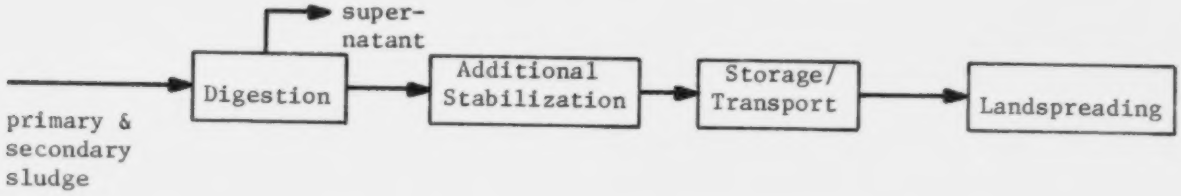
Sludge can also be disposed onto recreational lands or at designated landfill areas. Sludge can not be released to surface waters because of existing public health and EPA regulations designed to encourage land disposal of sludge to reduce the significance of public health and water quality-related impacts.

The selection of specific sludge treatment processes classified as digestion, additional stabilization, conditioning and dewatering on Figure 2-1 for small community systems is strictly a question of costs and

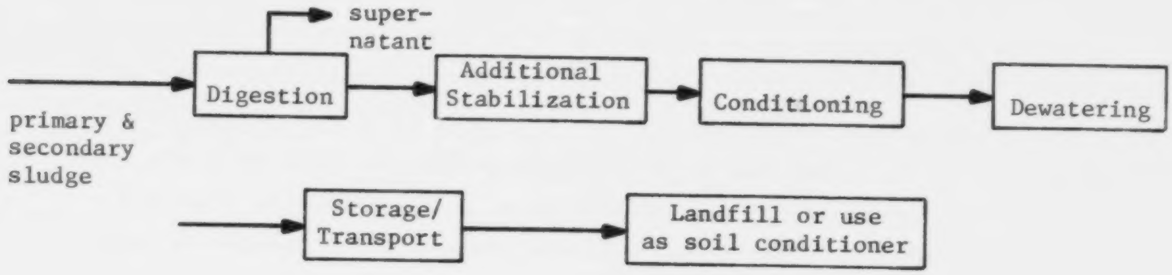
FIGURE 2-1

CONCEIVABLE SLUDGE
MANAGEMENT ALTERNATIVES

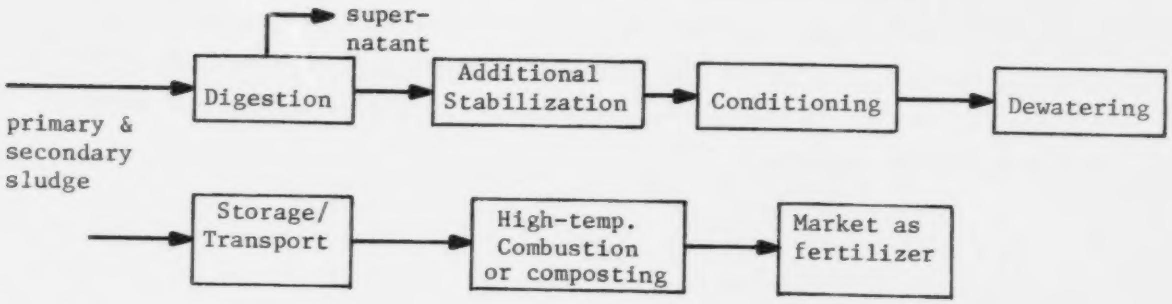
LANDSPREADING: Reduce volume to 2 or 3 percent solids, stabilize and incorporate liquid sludge into soil.


super-
natant
Digestion
Additional Stabilization
Storage/ Transport
Landspreading
primary & secondary sludge

LANDFILLING AND COMPOSTING: Stabilize, dewater to 20 percent solids, combine with soil and landfill or use as soil conditioner.


super-
natant
Digestion
Additional Stabilization
Conditioning
Dewatering
primary & secondary sludge
Storage/ Transport
Landfill or use as soil conditioner

INCINERATION: Stabilize, dewater, combust to 80 percent solids and market as fertilizer.


super-
natant
Digestion
Additional Stabilization
Conditioning
Dewatering
primary & secondary sludge
Storage/ Transport
High-temp. Combustion or composting
Market as fertilizer

suitability with particular sludges. Transport of sludge can be either by tank truck or dump truck if disposal is not adjacent to a wastewater treatment plant.

PART D - IDENTIFICATION OF AVAILABLE NONSTRUCTURAL MEASURES

1. Water Conservation and Other Flow Reduction Measures

Within Blount County, occasional water shortages have occurred during dry periods such as the summer of 1979. Nearly the entire study area depends upon the Little River as its sole water supply source. Flows during dry periods can not support existing water demands, not to mention higher water demands projected for the future. Water conservation is one method which can help reduce this potential for future water shortages.

The six interdependent water supply systems serving the study area could implement and enforce plumbing codes which could reduce water usage at toilets, shower heads and faucets within all newly constructed or renovated buildings.

Voluntary water conservation combined with public information is another measure. However, response to such efforts has been effective in other parts of the eastern United States for only short time periods.

Adjusting water rates is a third water conservation technique, assuming water use will decline as the price for water increases. The MUB increased water rates by 20 percent in September of 1980. This increase did not have reduction in water usage as one of its objectives. A concern of any water department with reducing water usage is that revenues could also decline. This water conservation technique has not been widely accepted as one that is effective, preferable or equitable to all water users.

2. Wastewater Management Districts

Currently in Blount County, septic tank-disposal systems at individual homes and businesses are designed, permitted and inspected by the Blount County Health Department. Following installation, the health department assumes no responsibility unless a malfunction is reported. Small community systems are designed, implemented and maintained by the developer of a subdivision while the Tennessee Department of Public Health, Division of Water Quality Control, issues a discharge permit and oversees compliance with permit requirements.

Another institutional structure for managing on-lot and/or small community wastewater systems is to either establish a separate management agency or expand the responsibilities and funds allocated to the county health department. The purpose of such an agency would be to manage all aspects of implementing small systems: planning, design, installation, operation, maintenance, monitoring and financing. Specific functions of such an agency are listed in Table II-8. For the large number of small wastewater systems that could remain in operation, such a management agency by itself could handle these small systems, while the MUB and the cities of Alcoa and Maryville manage the regional sewer system.

Major decisions to be made concerning the development of such a management approach include the following:

- Do the benefits of management districts exceed costs? Are the benefits affordable?
- Which of the engineering and operation functions listed in Table II-8 are to be provided by a management agency, such as the county health department and which are to be provided by contracted, private organizations?
- Is public or private ownership of small wastewater systems preferred?
- What form of financing is to be implemented? Is a management district to have powers to collect its own revenues?

3. Optimum Use of Wastewater Facilities

The EPA continues to strive for improved operation and maintenance at treatment plants and throughout wastewater collection systems. These activities, with the exception of infiltration/inflow rehabilitation are

TABLE II-8

POSSIBLE FUNCTIONS OF A WASTEWATER AGENCY MANAGING ON-LOT AND/OR SMALL COMMUNITY SYSTEMS

Component	Functions
Administrative	User charge system Staffing Enforcement of regulations Contract and grant procedures
Engineering	Conditions for issuing permits Design standards Site investigations Approval of proposed designs Inspection during installations Contractor training (if needed) *Pilot studies of alternative technologies
Operations	Periodic inspections Septage management *Water quality monitoring (surface water and groundwater)
Public Information	*Periodic workshops/education Annual reports Inter-agency activities Information about bonds or assessments *Right-of-way acquisition (small community systems)

*Functions not essential for the management agency to undertake.

not eligible for EPA construction grant funds. However, implementation of every effort not related to grants is encouraged. Such efforts include:

- Rehabilitation of sections of sewer lines estimated to be cost-effective to reduce infiltration/inflow rather than to treat supplemental flows at the regional treatment plant.
- Periodic inspection of sewer lines for excessive pipe corrosion.
- Adequate training and certification of all treatment plant operators for the regional wastewater treatment plant and for small community treatment systems.
- Periodic inspection of on-lot systems by trained personnel that can remedy failing of stressed systems.

Concentrations of suspended solids, nitrogen and fecal coliforms within effluent released from the Maryville Regional Wastewater Treatment Plant (WWTP) have exceeded permit limitations in the past. Possible causes of these excessive concentrations are infiltration/inflow and inconsistent treatment plant operation. During dry weather periods, effluent from the regional WWTP generally complies with permit limitations.

Plant operators at the Maryville regional plant indicate they have not yet found an effective method for determining rates at which to waste or recycle sludge from primary and secondary treatment processes. Optimum values for such control parameters as sludge residence time and the food-to-microorganism ratio could be implemented after various operating procedures are conducted and tested.

One final point worth mentioning is that existing interceptors near the Maryville regional plant are large enough to handle future flows projected in the Blount County 201 Plan. Therefore, capacity is available in these interceptors to store peak flows travelling to the regional plant.

4. Land Use and Development Controls

Land use controls which provide for planned development may limit potential adverse impacts on water quality (and other environmental amenities) from uncontrolled growth. Limiting the density of development or preventing development within unique agricultural lands are specific applications of this type of control.

In order to effectively plan and manage land use there are a variety of land management tools and techniques that are available to the local governments in the study area. These techniques include:

- Comprehensive plans
- Zoning ordinances
- Subdivision and land development regulations
- Easements
- Fee simple acquisition of land
- Staged growth policies
- Conservation zoning district
- Model zoning ordinance
- Transfer of development rights.

PART E - WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives were developed by combining wastewater transmission, treatment and disposal techniques discussed earlier in this chapter. This section presents a description of each of these alternatives. Table II-9 describes each alternative in general terms. Table II-10 lists each of these six alternatives and describes the service area for each; the methods of wastewater collection, treatment and disposal and the applicable sludge disposal methods. Table II-11 presents the 1980 and 2000 populations for each of the service areas proposed for different wastewater facilities under each of the six alternatives.

1. The No Federal Action Alternative

This alternative assumes that federal grant money is not available to Blount County and that future wastewater management facilities are developed with only locally available funds. This alternative consists of a combination of on-lot, small community and interceptor systems such as the configuration shown on Figure 2-2.

TABLE II-9

ALTERNATIVES EVALUATED AS PART OF THE BLOUNT COUNTY EIS

Alternative		
Number	Name	Description of Alternative
1	No Federal Action	Wastewater management would be provided without federal funding in the manner presently employed utilizing conventional technologies. The extent of sewering would be as shown in Figure 2-2.
2	On-Lot Systems	Federal funding would be available only for renovating existing on-lot systems and for managing all wastewater flows generated by on-lot systems. All future wastewater needs in the County would be handled using on-lot systems.
3	Small Community Systems	Federal funding would be available only for cost-effective conventional or innovative/alternative (I/A) technologies serving 35 small community systems as shown on Figure 2-3.
4	The Suburban Maryville/ Alcoa Alternative	Federal funding would be available only for specific interceptors and pumping stations north and southwest of the city of Alcoa. (See Figure 2-4). No federal funding would be available for sewer laterals, for managing additional flows at the Maryville Regional WWTP or for on-lot systems in other portions of the study area.
5	The Limited 201 Alternative	Federal funding would be available only for interceptors and pumping stations extending throughout the study area as shown on Figure 2-5.
6	The Full 201 Alternative	Federal funding would be available only for interceptors and pumping stations extending throughout the study area as shown on Figure 2-6. These facilities are ones proposed for Stages II and III of the Blount County 201 Wastewater Facilities Plan (June 1976) to be eligible for federal funding.

TABLE II-10

ALTERNATIVES CONSIDERED IN THE EIS

ALTERNATIVE	AREA SERVED	COLLECTION	TREATMENT	DISPOSAL	SLUDGE DISPOSAL
1. No Federal Action	Maryville/Alcoa periphery	Interceptor/collector extension	Secondary treatment (activated sludge) at Maryville WWTP	Surface water discharge to the Tennessee River	Thickening, vacuum filtration, incineration at the Maryville Regional WWTP
	Townsend	Small diameter gravity sewers, pumping stations where necessary	Secondary (extended aeration)	Slow-rate land application	Aerobic digestion and liquid land spreading
	Outlying county areas	None	Septic tank	Absorption fields	Septage collected and disposed in a suitable manner package plant sludge dried and landfilled or transferred to the Maryville Regional WWTP
2. On-Lot Systems	Entire study area except Townsend	None	Septic tank	Absorption fields and sand mounds	Septage same as above
	Townsend	Small diameter gravity sewers, pumping stations where necessary	Secondary (extended aeration)	Slow-rate land application	Aerobic digestion and liquid land spreading
3. Small Community	35 small communities as shown on Figure 2-3	Gravity, pressure or vacuum sewers and associated pumps or collection stations	(a) Extended aeration or (b) Extended aeration plus filtration	(a) Rapid rate land application (b) Slow rate land application(1), or (c) Appropriate surface water discharge to the nearest river or stream	(a) Aerobic digestion plus drying and landfilling or (b) Aerobic digestion and liquid land spreading

TABLE II-10 (Cont.)

ALTERNATIVE	AREA SERVED	COLLECTION	TREATMENT	DISPOSAL	SLUDGE DISPOSAL
4. The Suburban Maryville/Alcoa Alternative	Carlton, Mentor, Polecat Br., Louisville Rd., Lakemont and Fairview areas	Force mains and pumping stations	Secondary activated sludge at Maryville WWTP	Surface discharge to Tennessee River	Thickening, vacuum filtration and incineration at the Maryville Regional WWTP
	Townsend	Small diameter gravity sewers, pumping stations where necessary	Secondary (extended aeration)	Slow-rate land application	Aerobic digestion and liquid land spreading
5. The Limited 201	Decreased service areas from the Blount County 201 plan (See Figure 2-6)	Gravity sewers/force mains and pumping stations	Same as above	Same as above	Same as for Alternative 4 above
6. The Full 201	All service areas as delineated in the Blount County 201 Plan	Gravity sewers/force mains and pumping stations	Same as above	Same as above	Same as above

---

(1) Includes spray irrigation, lagoons or overland flow.

TABLE II-11

1980 AND 2000 POPULATIONS FOR SERVICE AREAS OF EACH ALTERNATIVE

Alternative	Population 1980	Population 2000
(1) NO FEDERAL ACTION		
Wildwood Interceptor Service	2,000	2,400
Periphery Sewered Extensions	9,600	11,000
Package Plants		
Townsend	500	700
On-Lot Systems	17,900	21,600
(2) ON-LOT SYSTEMS		
Population served by proposed renovations (15% of existing on-lot systems)	4,200	4,200
Population presently on sewers	6,200	7,500
Package Plant at Townsend	500	700
Remainder of Study Area	19,100	23,400
(3) SMALL COMMUNITY SYSTEMS		
1 Cactus Cove	170	200
2 Lakeview	210	250
3 Louisville	210	300
4 Carlton	350	500
5 Mentor	270	400
6 Chandler	210	250
7 Mimosa Estates	250	300
8 Topside	160	200
9 Lakeview Estates	200	250
10 Lakemont	160	200
11 Roule Drive	120	150
12 Littlebrook	120	150
13 Mimosa Heights-Glenmore Estates	250	300
14 Cedar Hill	250	300
15 Rockford	200	250
16 Asbury Estates	160	400
17 Dellwood	320	400
18 Twelve Oaks	240	300
19 Seymour-Shooks Gap	460	600
20 Rocky Branch	440	500

TABLE II-11 (Continued

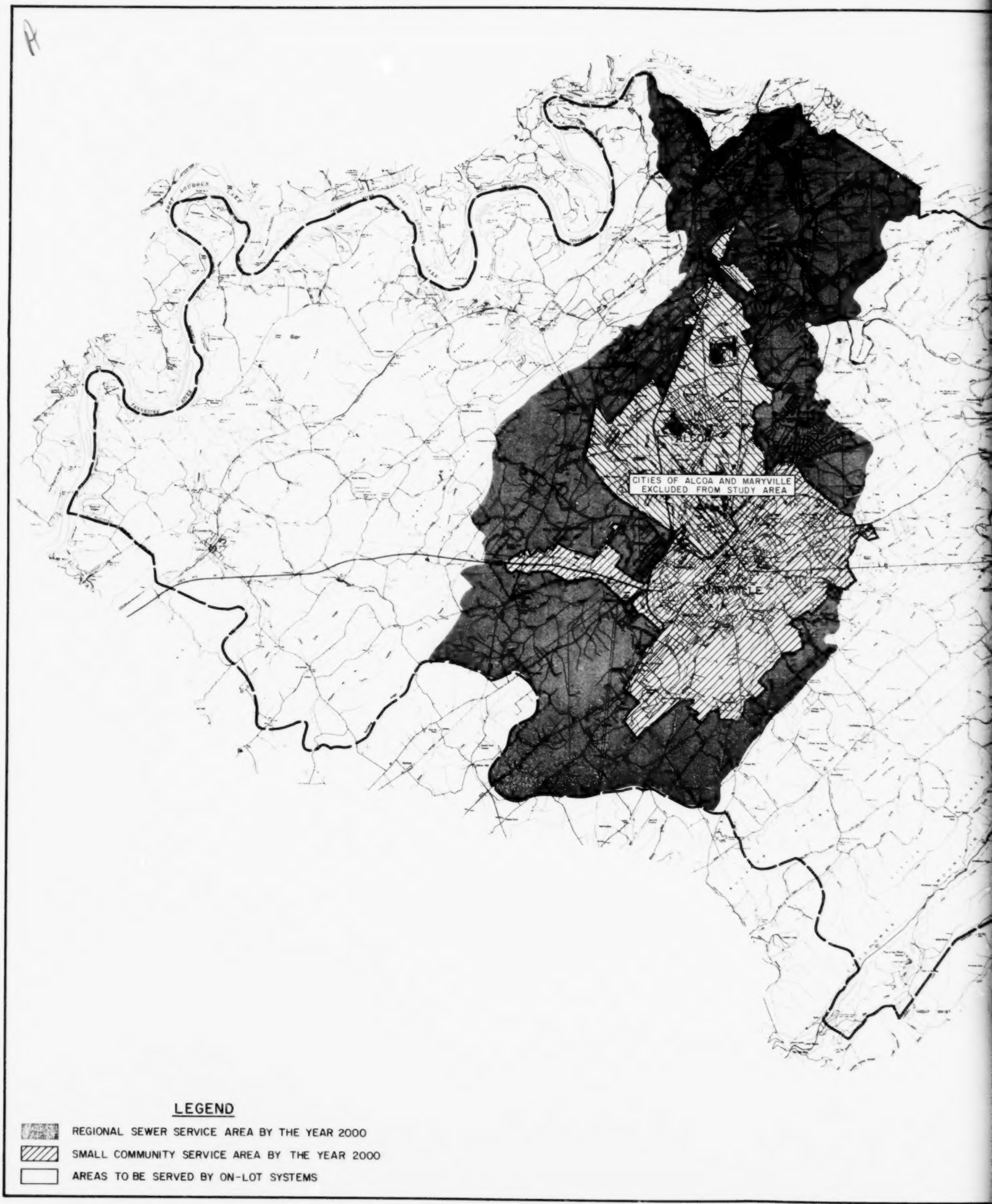
Alternative	Population 1980	Population 2000
21 Walland	140	150
22 Kinzel Springs	180	250
23 Townsend	500	700
24 Top of the World Estates	80	100
25 Chilhowee View	180	200
26 College Park Estates	140	150
27 Forest Hill	140	150
28 Fariview	300	400
29 Cherokee Heights-Highland Acres	300	400
30 West Maryville	260	350
31 Bungalow	740	1,000
32 Dotson	220	300
33 Alnwick	300	400
34 Smoky View Estates	480	700
35 Friendsville	560	600
Total Small Community	9,270	11,800
On-lot systems	14,600	16,508
Population connected to existing sewers	6,200	7,500
(4) SUBURBAN MARYVILLE-ALCOA		
Wildwood interceptor service	2,000	2,400
Alcoa North sewered	1,650	2,150
Periphery sewer extensions	8,900	10,200
Townsend small community system	500	700
On-Lot systems	16,900	20,300
(5) LIMITED 201		
Wildwood interceptor service	2,000	2,400
Periphery sewer extensions	5,140	5,650
Friendsville interceptor	2,480	2,990
Shooks Gap interceptor	900	1,130
Townsend interceptor	1,240	1,570
Flag Branch interceptor	360	420
Dellwood interceptor	480	600
Alnwick interceptor	2,520	3,320
Fairview interceptor	1,130	1,240
Singleton-Lakemont interceptor	670	820
Total sewered	16,920	20,140
On-lot systems	13,000	15,600

TABLE II-11 (Continued)

Alternative	Population 1980	Population 2000
(6) FULL 201		
Population presently on sewers	2,140	3,640
Periphery Sewer Extensions (Glenmore Estates, Russell Branch, Russell Road, Alcoa Trail, Duncan Creek, Brown Creek, Bungalowtown, Highland Acres)	4,650	6,380
Friendsville (Friendsville, Carlton, Mentor)	1,030	3,320
Townsend (Kinzel Springs, Walland	1,210	3,890
Dellwood	660	890
Pea Ridge	820	950
Flag Branch	780	940
Crooked Creek	1,510	2,820
Smoky View Estates/Culton Creek	370	510
Fairview/Westwood Hills/ Clover Hill/Needmore Hill)	4,730	7,120
Singleton/Lakemont (incl. Louisville Rd. and Polecat Branch)	1,580	2,100
Lakeview/Rockford	570	1,210
Total sewered	21,350	33,800
On-lot systems	15,100	9,800

Note: Populations shown for alternatives 1 through 5 are based on estimates developed as part of this EIS. Populations shown for alternative 6, on the other hand, are based on estimates developed as part of the Blount County 201 Plan, (1976).

A


CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
ALCOA
MARYVILLE
LEGEND
▒ REGIONAL SEWER SERVICE AREA BY THE YEAR 2000
▨ SMALL COMMUNITY SERVICE AREA BY THE YEAR 2000
☐ AREAS TO BE SERVED BY ON-LOT SYSTEMS

B

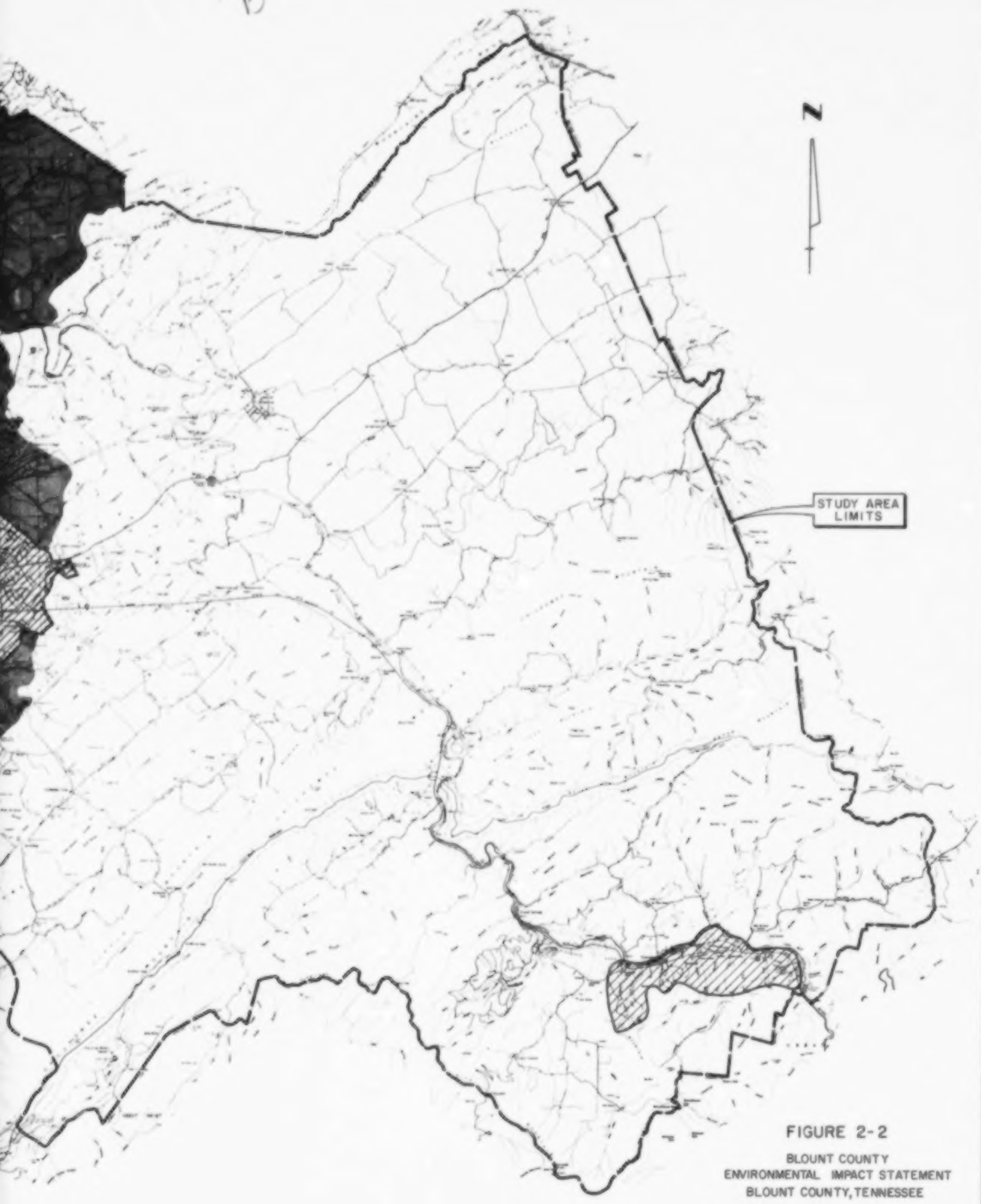

N
STUDY AREA LIMITS
7000
0
7000
14000
SCALE IN FEET

FIGURE 2-2

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

THE NO-FEDERAL ACTION ALTERNATIVE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

In the more heavily developed areas adjacent to Maryville and Alcoa, it is probable that sewers would be gradually extended from the existing system when it is financially feasible. Sizes of interceptor lines and package plants for the no federal action alternative are shown in Table II-12.

In the remainder of the County, it is probable that treatment and disposal of wastewater will continue to be handled by systems on each property owner's lot. In the past, septic tank-soil absorption systems have been the standard method of on-lot disposal, and unless County regulations are changed, it is most likely that this system will remain dominant in the future. Use of these systems would be limited to areas with suitable soil and site conditions, and would limit minimum lot sizes to 20,000 to 25,000 square feet.

Under certain conditions, new development could also be served by small package treatment plants funded and built by individual developers. It is likely that more intensive developments - commercial centers, garden apartments, townhouses or hotels - will be built using package treatment systems. The economics of these developments are more likely to support package plant costs and the large, concentrated volume of wastewater produced by such projects is often beyond the capacity of typical soil absorption systems. In many cases such large developments would require disposal systems larger than lot sizes or terrain limitations allow.

Under this alternative, a small community wastewater system may be appropriate for the city of Townsend. The presumption is that with development pressure, some sort of sewer system may need to be installed to allow developers to construct high density projects. The state of Tennessee Department of Public Health probably will not allow treated wastewater to be discharged to the Little River; therefore, costs for slow rate land disposal of wastewater at Townsend are included in this alternative.

TABLE II-12

SIZES OF PROPOSED WASTEWATER INTERCEPTORS AND SMALL COMMUNITY TREATMENT PLANTS FOR ALTERNATIVE 1 - NO FEDERAL ACTION ALTERNATIVE

Interceptor	Type	Inside Diameter of Pipe(inches)	Length(feet)	Number of Pumping Stations
Sewers for Periphery Area				
Fairview	Force Main(FM)	4	8,700	1
	Gravity(G)	8	5,000	0
Singleton	FM	4	3,300	1
Lakemont	FM	4	4,000	1
Sewers for Other Areas				
None				

Small Community Systems	Description	Average Daily, Year 2000 Treatment Capacity, mgd
Townsend	Small-diameter gravity sewers	0.036
	Extended aeration treatment (with or without filtration)	
	Wastewater and sludge disposal.	

2. The On-Lot Systems Alternative

This alternative is comprised of three components. First is the federally funded renovation of existing on-lot systems in the study area which are presently malfunctioning or failing. Based on the study of on-lot failures by the EPA's Environmental Photographic Interpretation Center (EPIC), year-round malfunctioning or failing systems make up about 15% of all present systems. The second component is the non-federally funded development of on-lot systems to accommodate the wastewater needs of new development in all parts of the study area. The third component is a small community system with land application at Townsend.

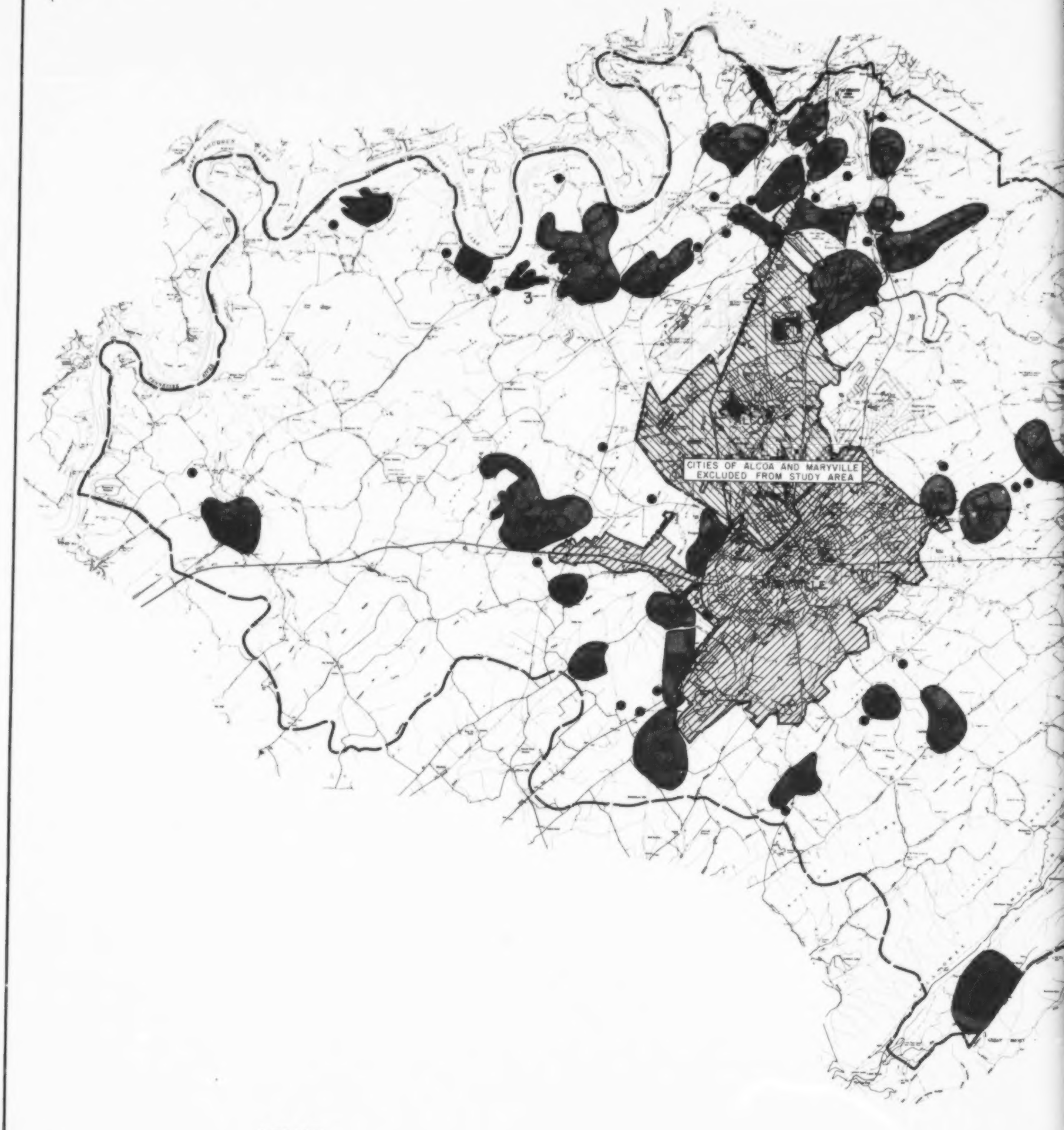
3. Small Community Systems Alternative

This alternative would consist of 35 individual, federally funded small community systems in the areas indicated on Figure 2-3. A variety of options for collection, treatment and disposal were considered including gravity sewers, pressure sewers, extended aeration, extended aeration plus filtration, surface discharge and land application. For costing purposes, the least expensive combination of options was selected-- small diameter gravity sewers, extended aeration treatment plus filtration and disposal of effluent to surface waters. Table II-13 presents the sizing for each of the small community systems in this alternative. In other parts of the study area not served by small community systems, locally funded on-lot systems would be used for treatment and disposal of wastewater.

4. The Suburban Maryville-Alcoa Alternative

This alternative would provide federally funded interceptor sewers to the areas north and west of Alcoa and southwest of Maryville (See Figure 2-4). Other areas proposed for sewer extensions under no federal action would be locally funded as would a small community system in Townsend and on-lot systems in the remaining portions of the study area. Table II-14 presents the sizing for the small community system in this alternative.

R


3
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
MARYVILLE

LEGEND

○ SMALL COMMUNITY SERVICE AREA

⬬ AREAS TO BE SERVED BY ON-LOT SYSTEMS

● PREFERRED DISPOSAL SITE BASED ON SOIL CHARACTERISTICS AND LAND USE

NOTE: SYSTEM NUMBERS DESIGNATED IN THIS FIGURE CORRESPOND TO NUMBERS SHOWN IN TABLE 7.1- OF THE ALTERNATIVES DEVELOPMENT TECHNICAL REFERENCE DOCUMENT.

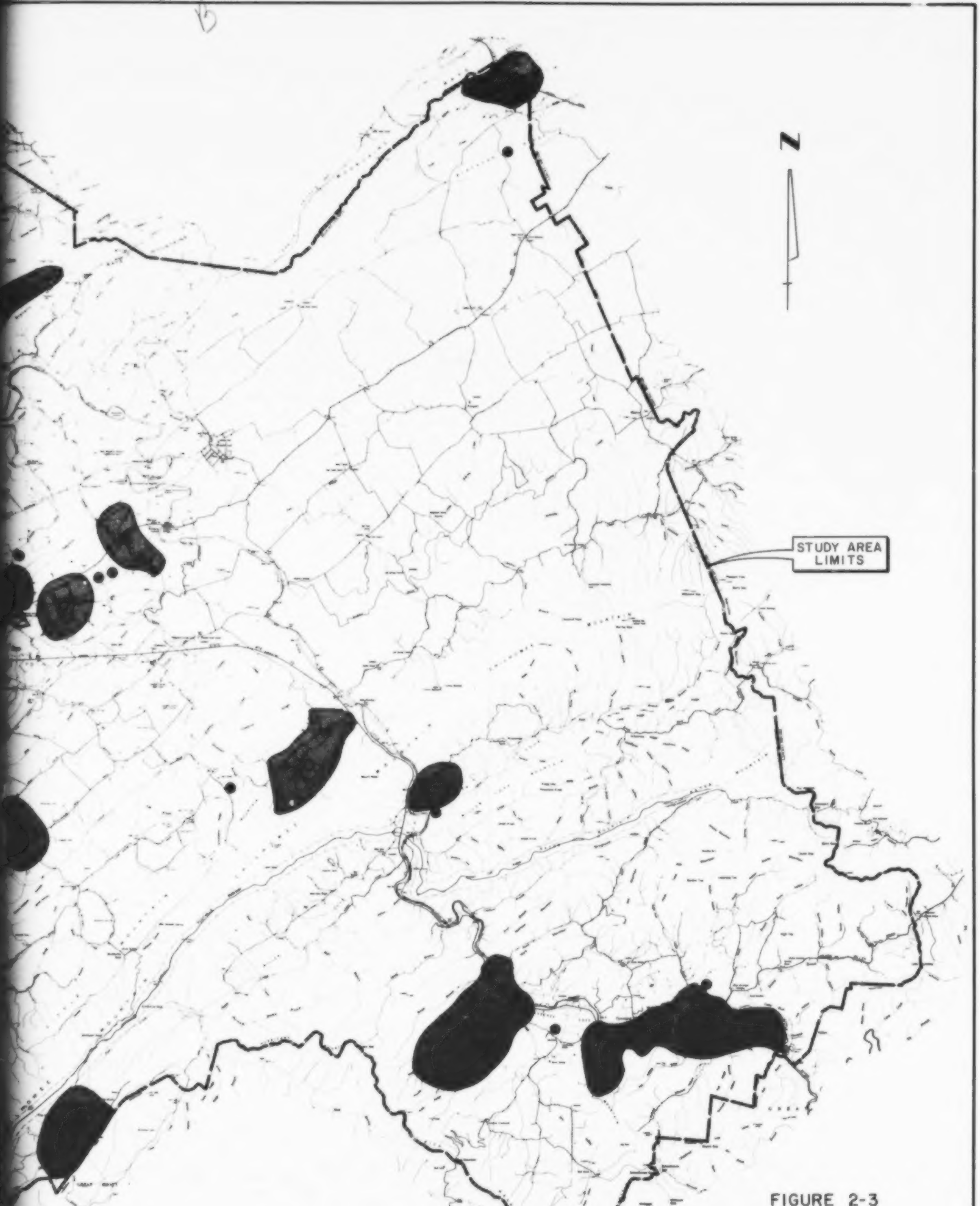

N
STUDY AREA LIMITS

FIGURE 2-3

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

POSSIBLE LOCATIONS FOR
SMALL COMMUNITY SYSTEMS

7000
0
7000
14000
SCALE IN FEET

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

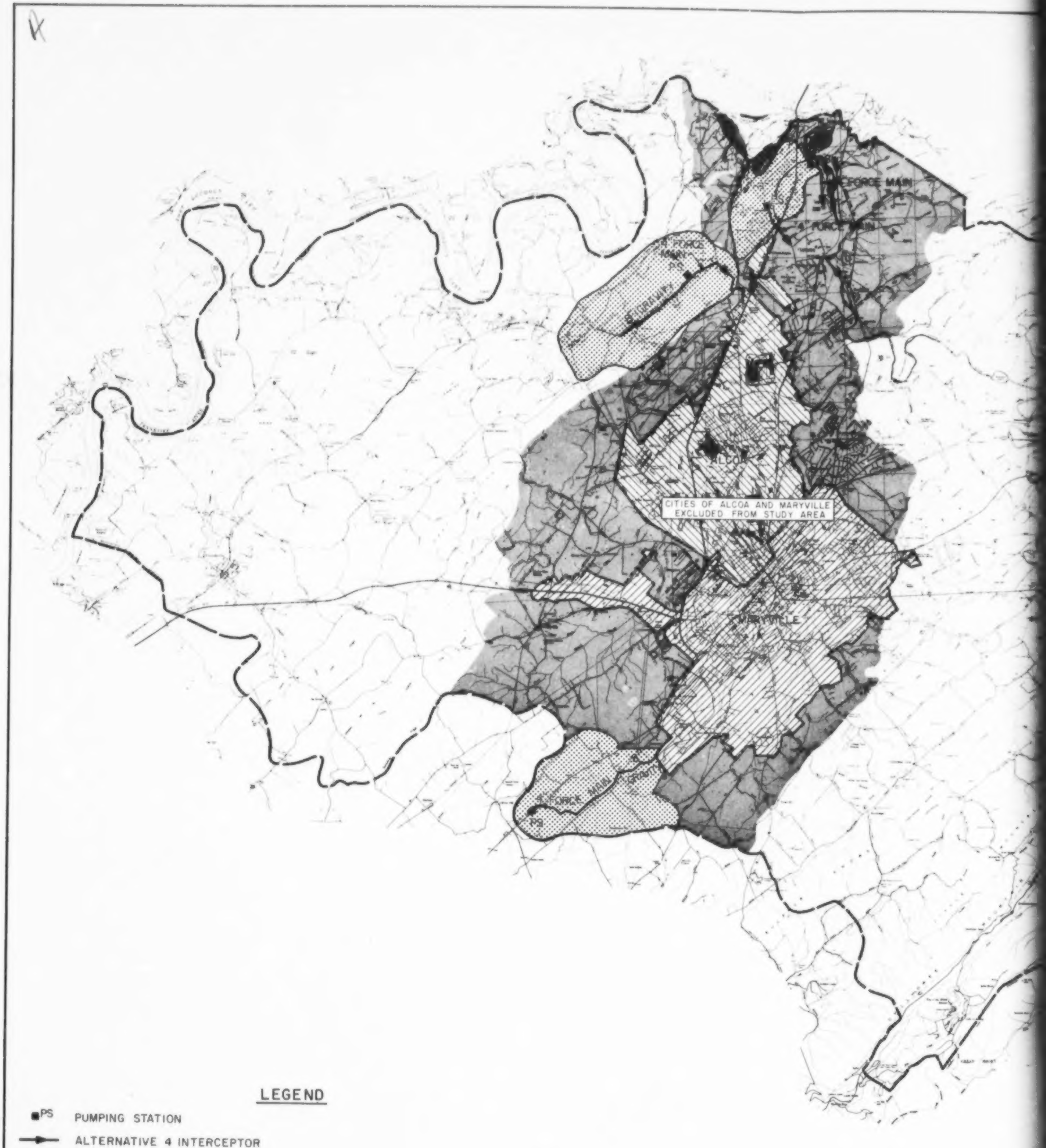
ESIGNATED IN THIS FIGURE
BERS SHOWN IN TABLE 7.1-3
S DEVELOPMENT TECHNICAL
T.

TABLE II-13

SIZES AND PREFERRED SECONDARY TREATMENT PROCESSES FOR EACH POTENTIAL SMALL COMMUNITY SYSTEM WITHIN ALTERNATIVE 3

Community Number	Projections for the Year 2000		Preferred Method of Secondary Treatment(1)
	Approx. Population To Be Served	Average Daily Wastewater Flows, MGD	
1	200	0.010	EA
2	250	0.013	EA
3	300	0.016	EA
4	500	0.026	EA
5	400	0.021	EA
6	250	0.013	EA
7	300	0.016	EA
8	200	0.010	EA
9	250	0.013	EA
10	200	0.010	EA
11	150	0.008	EA
12	150	0.008	EA
13	300	0.016	EA
14	300	0.016	EA
15	250	0.013	EA
16	200	0.010	EA
17	400	0.021	EA
18	300	0.016	EA
19	600	0.031	EA
20	500	0.026	EA
21	150	0.008	EA
22	250	0.013	EA
23	700	0.036	EA
24	100	0.005	EA
25	200	0.010	EA
26	150	0.008	EA
27	150	0.008	EA
28	400	0.021	EA
29	400	0.021	EA
30	350	0.018	EA
31	1,000	0.052	EA
32	300	0.016	EA
33	400	0.021	EA
34	700	0.036	EA
35	600	0.031	EA

(1) EA - extended aeration including the possibility of oxidation ditches.


FORCE MAIN
FORCE MAIN
FORCE MAIN
PS
FORCE MAIN
PS
ALCOA
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
MARYVILLE
LEGEND
■PS PUMPING STATION
ALTERNATIVE 4 INTERCEPTOR
ALTERNATIVE 4 SERVICE AREA
OTHER AREAS WITHIN THE REGIONAL SEWER SERVICE AREA BY THE YEAR 2000
SMALL COMMUNITY SERVICE AREA BY THE YEAR 2000
AREAS TO BE SERVED BY ON-LOT SYSTEMS

B

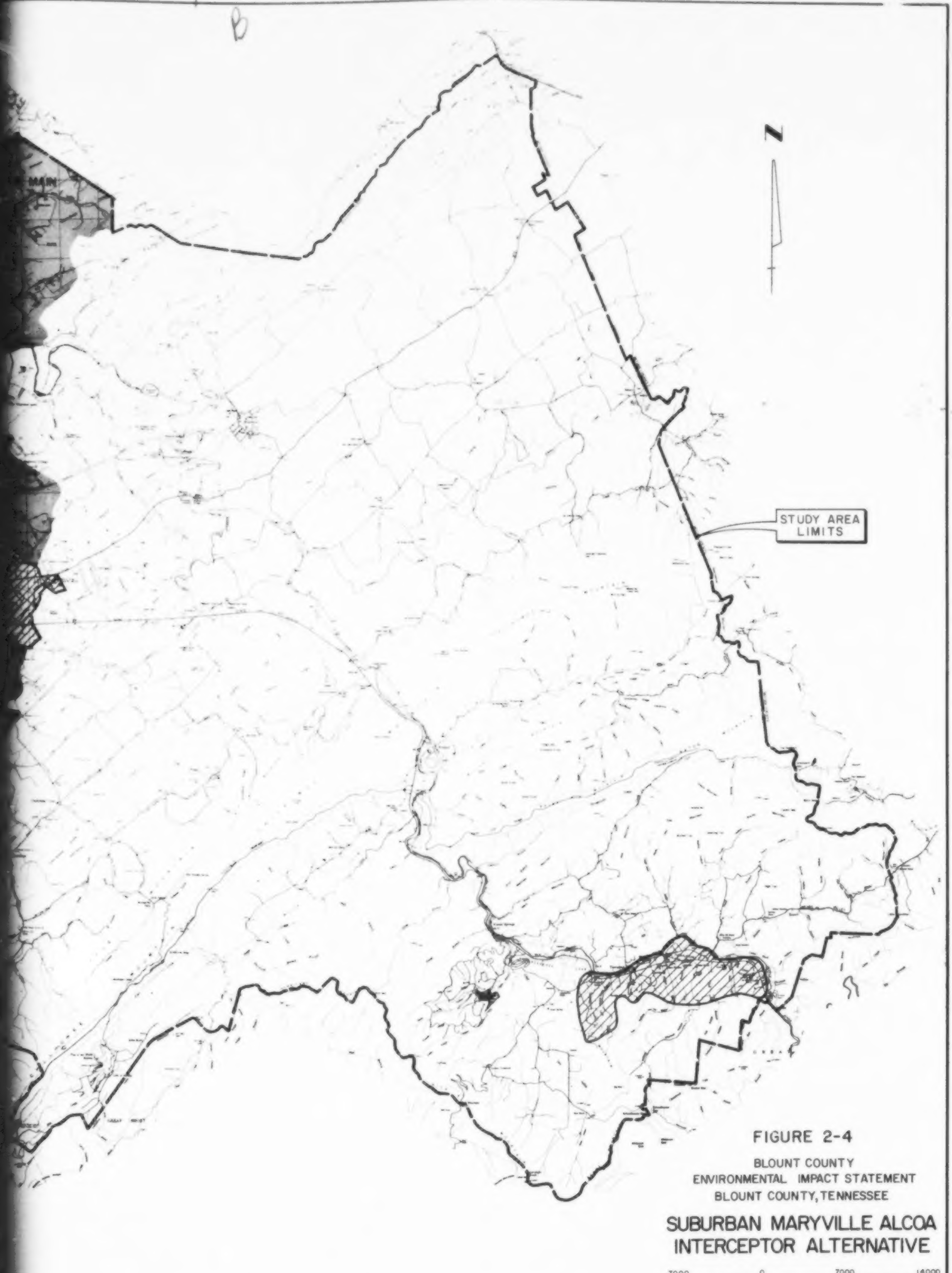

N
STUDY AREA LIMITS
MAIN
7000
0
7000
14000
SCALE IN FEET

FIGURE 2-4

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

SUBURBAN MARYVILLE ALCOA INTERCEPTOR ALTERNATIVE

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

TABLE II-14

SIZES OF PROPOSED WASTEWATER INTERCEPTORS AND SMALL COMMUNITY TREATMENT PLANTS FOR ALTERNATIVE 4 - MARYVILLE-ALCOA SUBURBAN ALTERNATIVE

Interceptor	Type	Inside Diameter of Pipe(inches)	Length(feet)	Number of Pumping Stations
Sewers for Periphery Area				
Fairview	Force Main(FM)	4	8,700	1
	Gravity(G)	8	5,000	0
*Singleton	FM	4	3,300	1
*Lakemont	FM	4	4,000	1
Sewers for Other Areas				
*Carlton	G	8	2,600	0
	G	8	6,000	0
	FM	4	10,300	1

	Description	Average Daily, Year 2000 Treatment Capacity, mgd
Small Community System		
Townsend	Small-diameter gravity sewers Extended aeration treatment (with or without filtration) Wastewater and sludge disposal	0.036

*Eligible for Federal funding if this alternative is preferred for implementation.

5. The Limited 201 Alternative

This alternative would provide federally funded interceptors to extensive service areas throughout the study area as shown on Figure 2-5. The new interceptors shown on this figure connect with existing lines flowing to the Maryville Regional WWTP. Sizes of these lines and pumping stations included in this alternative are presented in Table II-15. The remaining portions of the study area would be served by on-lot systems not supported by federal funds.

6. Full 201 Alternative

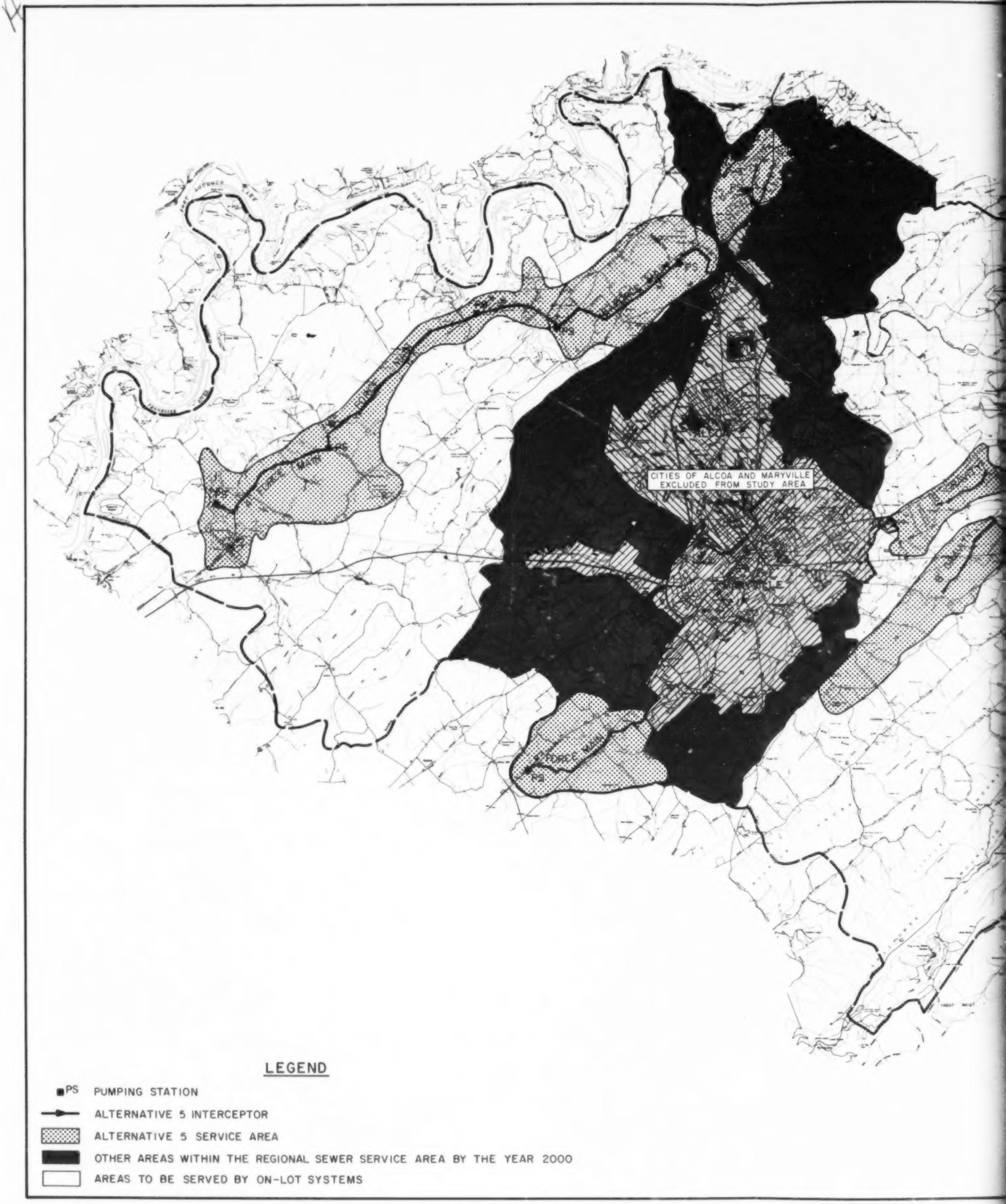
This alternative includes all of the federally fundable facilities included within the Blount County 201 Wastewater Facilities Plan as shown on Figure 2-6. The interceptors shown on this figure also connect with existing interceptors. Sizes of primary interceptor lines and pumping stations in this alternative are shown on Table II-16. Remaining portions of the study area would be served by on-lot systems not supported by federal funds.

PART F - COST EVALUATION

1. Costing Procedures and Assumptions

Important procedures which are part of this cost analysis are the following:

- Costs are based on all facilities being installed during 1984.
- The year 2000 is considered to be the end of the planning period. For facilities with service lives available beyond the year 2000, salvage values are calculated in accordance with U. S. EPA guidelines.
- Costs are based on local, Blount County or southeastern United States labor rates and equipment charges as much as possible.
- The U. S. EPA share of funding for conventional technologies is (0.75)x(0.90)x(project costs) where project costs are construction


CITIES OF ALCOA AND MARYVILLE
EXCLUDED FROM STUDY AREA
FORCE MAIN
PS
LEGEND
■PS PUMPING STATION
ALTERNATIVE 5 INTERCEPTOR
▨ ALTERNATIVE 5 SERVICE AREA
■ OTHER AREAS WITHIN THE REGIONAL SEWER SERVICE AREA BY THE YEAR 2000
☐ AREAS TO BE SERVED BY ON-LOT SYSTEMS

B

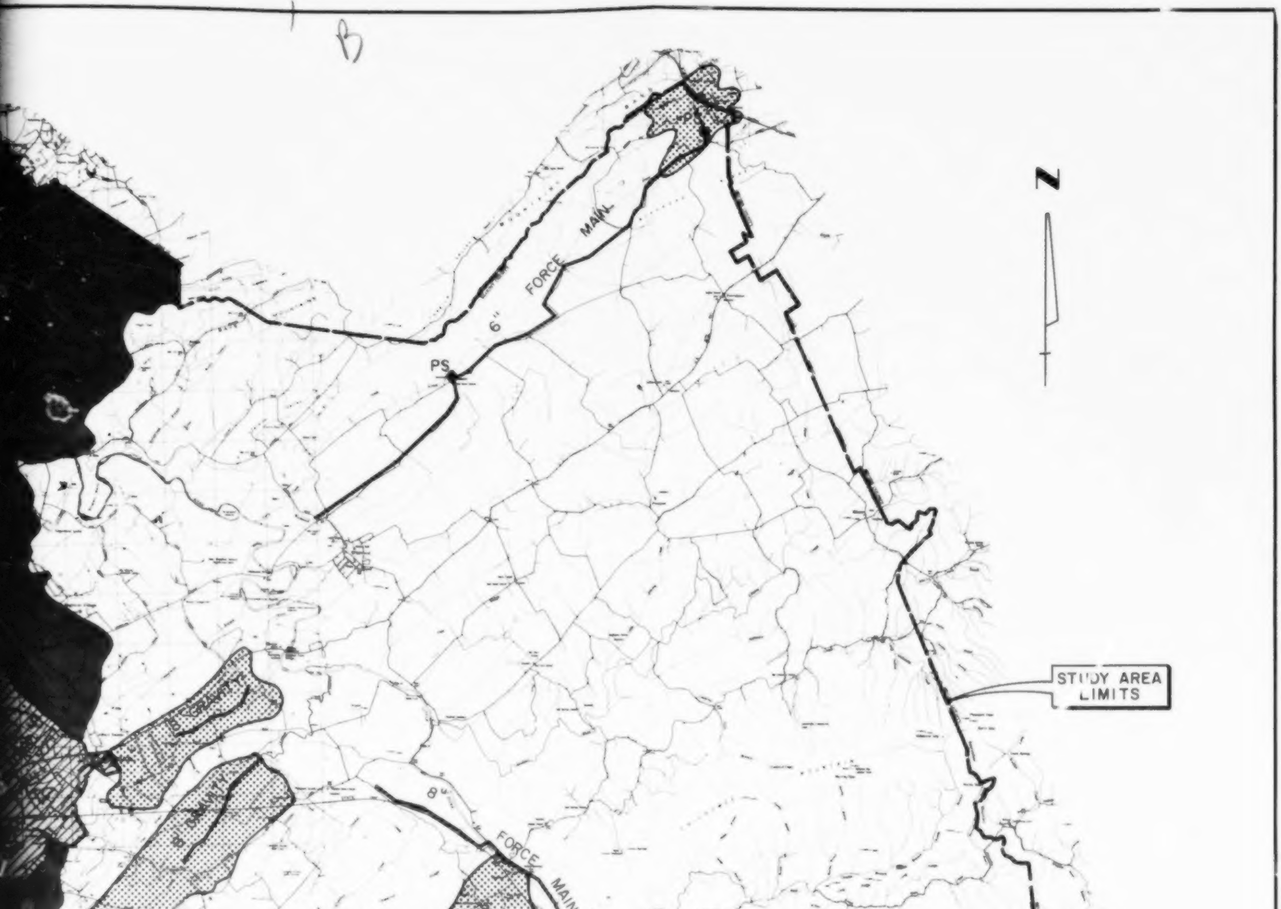

N
6" FORCE MAIN
PS
STUDY AREA LIMITS
8" FORCE MAIN
PS
6" FORCE MAIN
PS
PS

FIGURE 2-5

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

LIMITED 201
ALTERNATIVE

7000 0 7000 14000
SCALE IN FEET

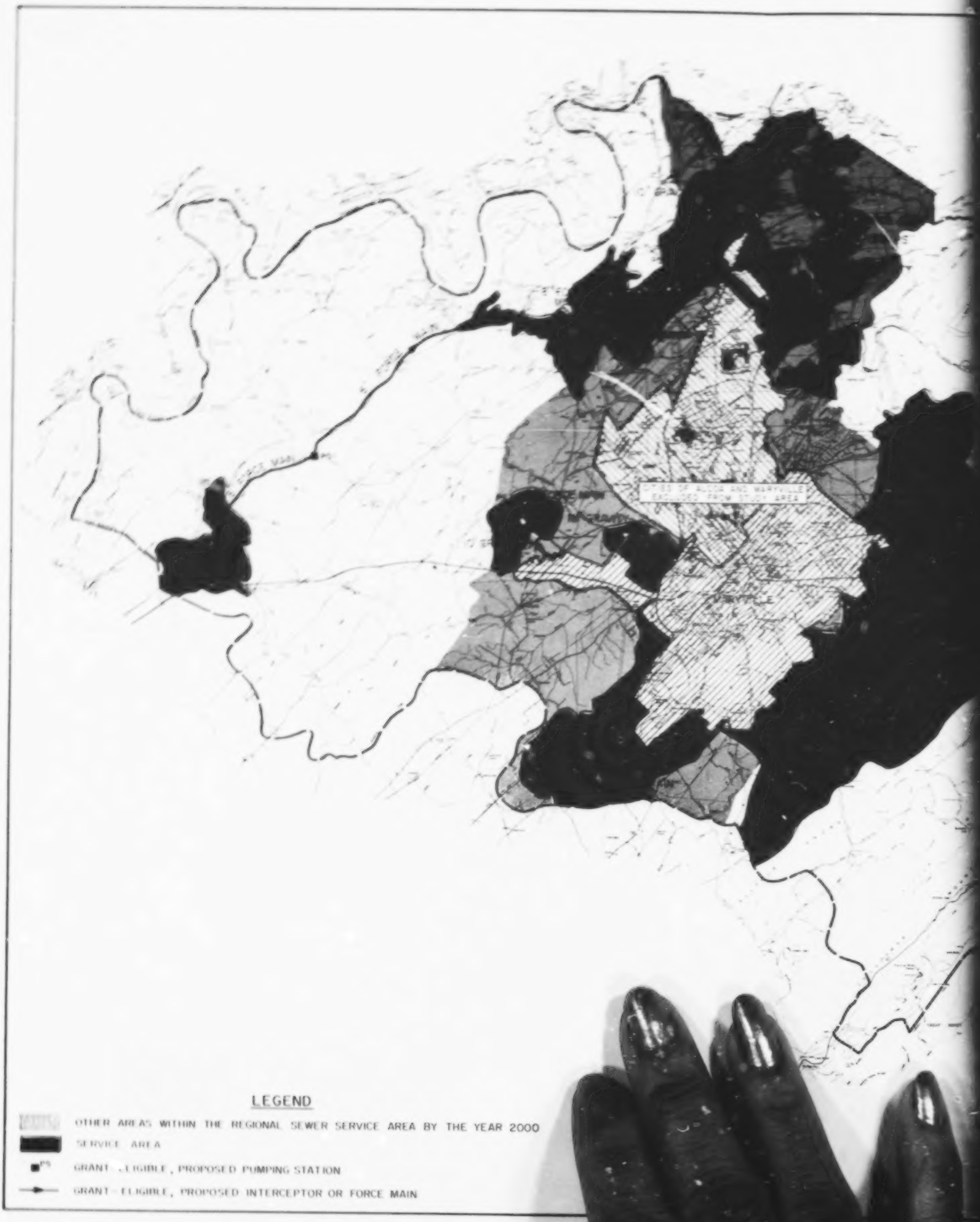
U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

TABLE II-15

SIZES OF PROPOSED WASTEWATER INTERCEPTORS AND SMALL COMMUNITY TREATMENT PLANTS FOR ALTERNATIVE 5 - LIMITED 201 ALTERNATIVE

Interceptor	Type	Inside Diameter of Pipe(inches)	Length(feet)	Number of Pumping Stations
Sewers for Periphery Area				
*Fairview	Force Main(FM)	4	8,700	1
	Gravity(G)	8	5,000	0
*Singleton	FM	4	3,300	1
*Lakemont	FM	4	4,000	1
Sewers for Other Areas				
*Friendsville	FM	4	12,000	1
	FM	6	38,000	2
	FM	8	10,300	2
*Shooks Gap	FM	6	34,000	2
*Townsend	FM	6	36,000	2
	FM	8	15,700	1
*Dellwood	G	8	6,300	0
*Flag Branch	G	8	9,300	0
Small Community Systems				

*Eligible for federal funding if this alternative is preferred for implementation.


FORCE MAIN
FORCE MAIN
PS
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
LEGEND
OTHER AREAS WITHIN THE REGIONAL SEWER SERVICE AREA BY THE YEAR 2000
SERVICE AREA
PS
GRANT-ELIGIBLE, PROPOSED PUMPING STATION
GRANT-ELIGIBLE, PROPOSED INTERCEPTOR OR FORCE MAIN

B

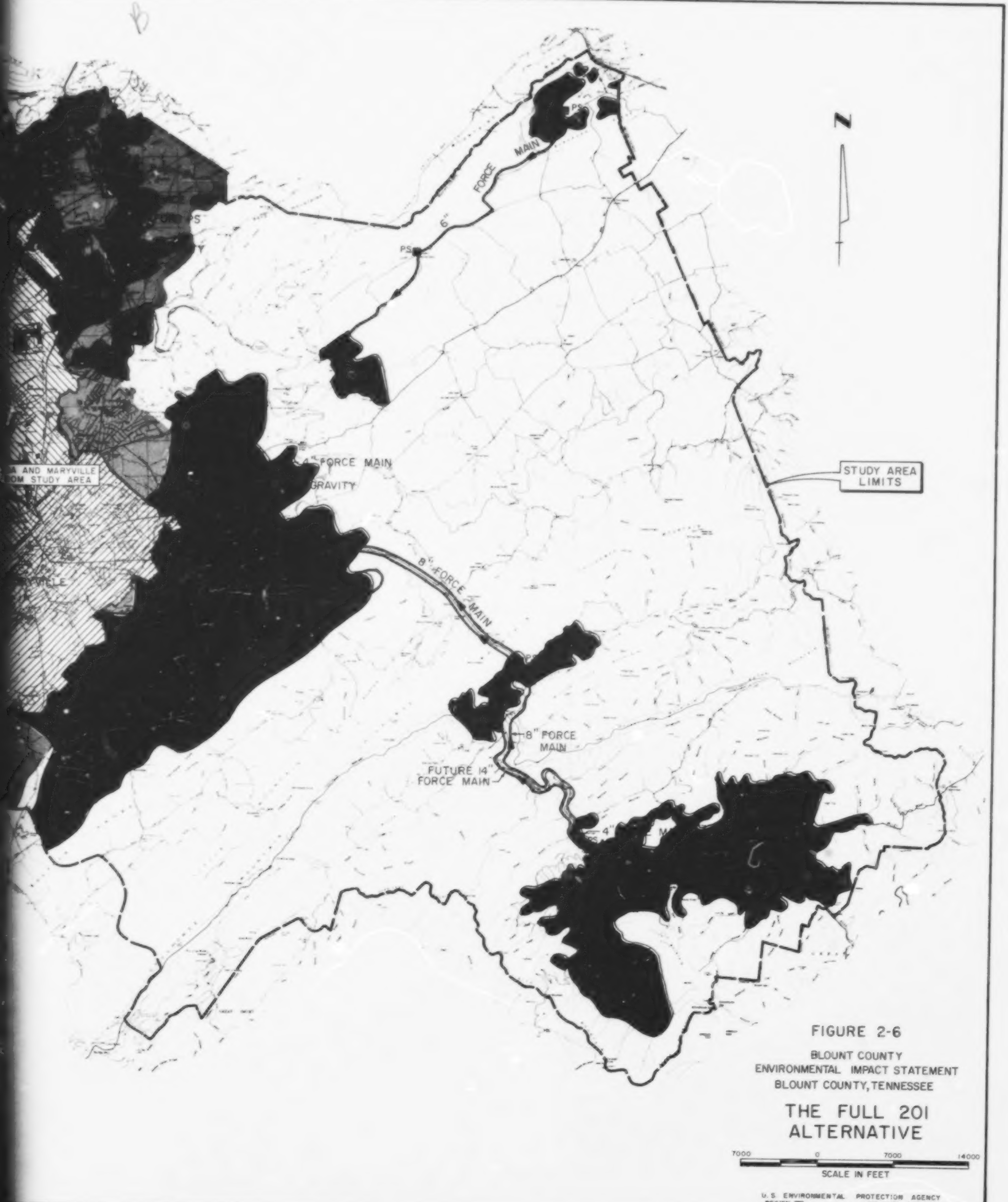

N
6" FORCE MAIN
PS
PS
PS
4" FORCE MAIN
GRAVITY
A AND MARYVILLE
OM STUDY AREA
VILLE
8" FORCE MAIN
PS
8" FORCE MAIN
FUTURE 14" FORCE MAIN
4" M
STUDY AREA LIMITS
7000
0
7000
14000
SCALE IN FEET

FIGURE 2-6

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

THE FULL 201
ALTERNATIVE

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

TABLE II-16

SIZES OF PROPOSED WASTEWATER INTERCEPTORS AND SMALL COMMUNITY TREATMENT PLANTS FOR ALTERNATIVE 6 - FULL 201 ALTERNATIVE

Interceptor	Type	Inside Diameter of Pipe(inches)	Length(feet)	Number of Pumping Stations
Sewers for Periphery Area				
*Fairview	Force Main(FM)	4	4,000	1
	Force Main(FM)	6	7,000	1
	Gravity(G)	10	8,000	0
*Singleton	FM	6	5,500	1
	G	10	3,000	0
*Lakemont	FM	4	4,000	1
*Lakeview	FM	4	7,000	1
*Smoky View Estates	FM	4	5,500	1
	G	10	4,200	0
*Bungalow	G	18	4,000	0
Sewers for Other Areas				
Friendsville and Carlton	FM	6	36,000	2
	FM	8	18,000	3
	G	10	15,000	0
Shooks Gap	FM	6	34,000	2
Townsend	FM	4	3,000	1
	FM	8	40,000	1
	FM	14	52,000	1
	G	18	10,000	0
Dellwood	G	10	8,400	0
Crooked Creek	G	10	1,000	0
	G	18	20,000	0

TABLE II-16 (Continued)

Sewers for Other Areas (Cont.)				
Flag Branch	G	10	5,000	0
	G	12	5,000	0
Flag Branch to Wildwood to Regional WWTP	FM	16	60,000	2
Small Community Systems				
None				

*Eligible for federal funding if this alternative is preferred for implementation.

costs plus engineering design and inspection fees, contractor contingencies, taxes and legal fees. Operation and maintenance costs are not eligible for construction grant funding. Table II-17 lists portions of projects which are eligible to be paid for utilizing federal funds.

- The U. S. EPA share of funding for innovative/alternative (I/A) technologies is (0.85)x(0.90)x(project costs). Innovative technologies incorporate higher levels of risk than conventional technologies in order to gain specific benefits. Alternative technologies are proven methods to reclaim wastewater, recycle nutrients, save energy or conserve resources. On-lot systems, land application of wastewater or sludge and pressure or vacuum sewer systems are alternative technologies according to the U. S. EPA. Determination as to which systems are innovative would need to be made on a case-by-case basis.

- The interest rate utilized in cost calcuations is 7.625 percent as specified (U.S. EPA, September 1981).

- The population projections developed as part of this EIS are an important ingredient within the cost calculations.

- Specific assumptions in estimating costs for sewers are as follows:
  - Average depths for gravity sewers range between 8 and 15 feet with no significant rock excavation or blasting.
  - Gravity sewer sizes are based on U. S. EPA design guidelines: 1) 6-inch minimum diameter, 2) able to transport design flows while being half-full.
  - PVC pipe is assumed to be utilized for pressure and vacuum sewers.
  - Costs for lateral sewers and house connections are included as part of total cost estimates.

- Costs not included are the following:
  - Sludge disposal costs for all small community systems except the Townsend system.

TABLE II-17

PORTIONS OF EACH ALTERNATIVE FOR WHICH FEDERAL FUNDING MAY OR MAY NOT BECOME AVAILABLE

Alternative	Fundable Portions	Portions of the Alternative Which Are Not Fundable
1 - No Federal Action	None	1) On-lot systems 2) Small community system in Townsend 3) Sewering of Alcoa-Maryville periphery or any other portion of the study area
2 - On-Lot Systems	1) Renovation of 15% of existing on-lot systems	1) Future on-lot systems 2) Small community system in Townsend 3) On-lot management
3 - Small Community Systems	1) 35 systems specified in Figure 2-3	1) On-lot systems 2) Sewering of Alcoa-Maryville periphery or any other area which could not be sewered by small community systems
4 - Suburban Maryville/Alcoa	1) Interceptors serving the dotted areas in Figure 2-4 2) Small community system at Townsend	1) On-lot systems 2) Sewering of Alcoa-Maryville periphery or any other area except the dotted areas in Figure 2-4
5 - Limited 201 Alternative	1) Interceptors serving the shaded areas in Figure 2-5	1) On-lot systems 2) Sewering of any area except the shaded areas in Figure 2-5
6 - Full 201 Alternative	1) Interceptors serving the shaded areas in Figure 2-6	1) On-lot systems 2) Sewering of any area except the shaded areas in Figure 2-6

NOTE: Only project costs for EPA-fundable facilities are eligible to be paid for utilizing federal funds. Operation and maintenance costs must be handled through local funding sources.

- Costs for additional treatment capacity at the Maryville Regional WWTP.
- Costs for operation and maintenance of existing sewer lines.
- Existing debt service costs.

2. Results

Brief conclusions regarding costs of the six (6) Blount County EIS alternatives are as follows:

- The alternative with the lowest net present worth is alternative 1, the no federal action alternative. Alternative 4, the Suburban Maryville-Alcoa alternative, has the second lowest net present worth, followed by alternative 2.

  With the accuracy of the cost estimating process, the costs for alternatives 1 and 4 do not differ significantly.

- On-lot management district costs push the net present worth of alternative 2 above the net present worths of alternatives 1 and 4. Total project costs are lowest for alternative 2.

- The net present worth for a cost-effective, I/A small community system in Townsend with land application is not significantly different from the cost for a Townsend interceptor.

A summary of the present worth costs for each alternative is presented on Table II-18. More detailed cost information for alternatives 1 through 6 is presented in Tables II-19 through II-24 respectively. In order for the reader to better understand these tables, definitions of the following cost terms are provided below:

- Project Cost - Costs and contingency and engineering fees for design and construction of proposed facilities
- Operation and Maintenance Cost - Annual expenses for labor, energy, materials and supplies needed to operate and properly maintain proposed facilities

TABLE II-18

COMPARISON OF ESTIMATED COSTS FOR THE SIX WASTEWATER MANAGEMENT ALTERNATIVES IN THE BLOUNT COUNTY, TENNESSEE EIS

		Net Present Worth	Local Annual Costs With Federal Funding (1)	Average User Charge for Sewered Areas (2)	Average User Charge for Unsewered Areas (3)	Amount of Potential Federal Grant
Alternative 1	No federal action	$ 8,210,000	$ 1,180,000	$ 205	$ 39	$ 0
Alternative 2	On-lot system renovation	13,000,000	1,370,000	118	100 (4)	4,050,000
Alternative 3	Small community systems	24,400,000	1,920,000	324	27	15,100,000
Alternative 4	Suburban Maryville-Alcoa	9,270,000	1,290,000	182	38	2,220,000
Alternative 5	Limited 201	13,000,000	1,580,000	251	32	3,300,000
Alternative 6	Full 201	18,200,000	1,430,000	187	51	12,600,000

(1) Local annual costs are costs to be handled by local sources assuming federal funds are provided for pre-designated facilities within each alternative except Alternative 1.

(2) The average user charge for sewered areas is the local annual cost for interceptors, laterals, house connections and small community systems divided by the average number of households assumed to be sewered by these facilities between 1980 and 2000.

(3) The average user charge for unsewered areas is the local annual costs for on-lot systems (and an on-lot management agency for Alternative 2) divided by the average number of households assumed to be served by on-lot systems between 1980 and 2000.

(4) User charge based on high level of management agency involvement and applying the costs of new septic tanks to current users of on-lot systems. This cost could be significantly reduced. See Chapter IV for a discussion of potential costs associated with the management agency.

TABLE II-19

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 1
NO FEDERAL ACTION ALTERNATIVE
(All costs are presented in thousands of dollars)

		Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Future House Connections Associated with Existing Wildwood Interceptor		$ 80	$ 0.8	$ 70	$ 47	$ 12	$ 58
Sewers for Periphery Area							
Fairview	Interceptor	319	0.8	262	167	41	221
	Pumping Station	26	6.0	65	9.4	2.3	62
Singleton	Interceptor	47	0.1	39	25	6.1	11
	Pumping Station	23	5.2	57	8.5	2.1	55
Lakemont	Interceptor	57	0.4	49	30	7.4	41
	Pumping Station	13	5.1	48	4.7	1.2	46
Laterals	Sewer Lines	3,250	9.7	2,680	1,980	476	2,200
House Connection	Sewer Lines	1,360	14	1,190	804	199	991
Small Community System(1)							
Townsend(2)		2,010	61	2,050	727	181	1,870
On-Lot Systems O&M for Existing Homes in Unsewered Locations (7,160 systems)							
Conventional septic tank-soil absorption systems		0	107	778	0	0	778

TABLE II-19 (Continued)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
On-Lot Systems for Future Homes in Unsewered Locations (1,480 systems by year 2000)						
Conventional septic tank-soil absorption systems (for 100% of these future homes)	$2,300	$ 22	$2,010	$540	$134	$1,880
				Estimated Grant Total[(3)],[(4)]		$6,210

(1)Estimated costs for small community systems are costs for the cost-effective, I/A environmentally acceptable collection, treatment and disposal options. These options are pressure sewers with effluent pumps, extended aeration treatment, wastewater disposal via land application and digestion landspreading of sludge.

(2)Includes house connections.

(3)The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.

(4)Costs for an on-lot or small community management district are not included for this alternative or for any of the other alternatives except Alternative 2.

TABLE II-20

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 2
ON-LOT SYSTEM ALTERNATIVE

(All costs are presented in thousands of dollars)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Small Community System						
Townsend	$2,010	$ 61	$2,050	$727	$181	$1,870
Future House Connections Associated with Existing Wildwood Interceptor (laterals assumed to already be in place)	80	0.8	70	47	12	58
Future Laterals and House Connections for Existing Sewer Lines in Periphery Area	678	3.4	569	401	99	470
On-Lot Systems for All Locations[1]						
*Renovation of 15% of existing Year 1980 units						
Conventional Systems	1,470	600	11,000	306	76	10,600
Mound Systems	3,820			794	197	
Future Units Installed between 1980 and 2000	3,020			627	155	
				Estimated Grand Total[2][3]		$13,000

*Eligible for federal funding.

[1] 15% of existing (1980) homes not to be sewered are proposed in this alternative to be renovated; 50% of these renovated systems would be mound systems and the other 50% would be conventional systems. The future systems would all be conventional systems.

[2] Costs for an on-lot management district are included for this alternative.

[3] The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.

TABLE II-21

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 3
SMALL COMMUNITY SYSTEM ALTERNATIVE

(All costs are presented in thousands of dollars)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Sewers for Periphery Area						
Future laterals and house connections for existing sewer lines in periphery area	$678	$ 3.4	$569	$401	$ 97	$470
Future House Connections Associated with Existing Wildwood Interceptor (laterals assumed to be already in place)						
Samll Community Systems(1),(2)						
Cactus Cove	540	25	614	195	48	566
Lakeview	546	24	613	197	49	564
Louisville	553	23	611	200	50	561
Carlton	728	24	755	263	65	690
Mentor	566	22	612	205	51	561
Chandler	546	24	613	197	49	564
Mimosa Estates	553	23	611	200	50	561
Topside	540	25	614	195	48	566
Lakeview Estates	546	24	613	197	49	564
Lakemont	540	25	614	195	48	566
Roule Drive	533	25	611	193	48	563
Littlebrook	533	25	611	193	48	563
Mimosa Heights-Glenwood Estates	553	23	611	200	50	561
Cedar Hill	553	23	611	200	50	561
Rockford	546	24	613	197	49	564
Asbury Estates	540	25	614	195	48	566
Dellwood	568	22	612	205	51	561
Twelve Oaks	553	21	611	200	50	561
Seymour-Shooks Gap	780	25	809	282	68	741
Rocky Branch	728	24	755	263	65	690
Walland	533	25	611	193	48	563
Kinzel Springs	506	24	613	197	49	564

TABLE II-21 (Continued)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Townsend	$2,010	$ 61	$2,050	$727	$181	$1,870
Top of the World Estates	527	26	612	190	47	564
Chilhowee View	540	25	614	195	48	566
College Park Estates	533	25	611	193	48	563
Forest Hill	533	25	611	193	48	563
Fairview	568	22	612	205	51	561
Cherokee Heights-Highland Acres	568	22	612	205	51	561
West Maryville	559	23	614	202	50	564
Bungalow	1,010	38	1,090	367	91	997
Dotson	553	23	611	200	50	561
Alnwick	568	22	612	205	51	561
Smoky View Estates	904	28	925	327	81	844
Friendsville	780	25	809	282	68	741
On-Lot System O&M for Existing Homes in Unsewered Locations (5,840 systems)						
Conventional septic tank-soil absorption system	0	88	637	0	0	637
On-Lot Systems for Future Homes In Unsewered Locations (760 systems by year 2000)						
Conventional septic tank-soil absorption systems (for 100% of these future homes)	1,180	11	1,030	277	69	961
				Estimated Grand Total[(3),(4)]		$24,400

---

(1) Estimated costs for small community systems are costs for the least costly, environmentally acceptable collection, treatment and disposal options. These options are small-diameter gravity sewers, extended aeration treatment plus filtration, wastewater disposal to the nearest river or stream, digestion and landspreading of sludge.

(2) Costs include house connections.

(3) The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.

(4) Costs for an on-lot or small community management district are not included for this alternative.

TABLE II-22

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 4
SUBURBAN MARYVILLE-ALCOA
(All costs are presented in thousands of dollars)

		Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Future House Connections Associated with Existing Wildwood Interceptor		$ 80	$ 0.8	$ 70	$ 47	$ 12	$ 58
Sewers for Periphery Area							
Fairview	Interceptor	319	0.8	262	167	41	221
	Pumping Station	26	6.0	65	9.4	2.3	62
*Singleton	Interceptor	47	0.1	39	25	6.1	33
	Pumping Station	23	5.2	57	8.5	2.1	55
*Lakemont	Interceptor	57	0.4	49	30	7.4	41
	Pumping Station	13	5.1	48	4.7	1.2	46
Lateral	Sewer Lines	3,250	9.7	2,680	1,920	476	2,200
House Connection	Sewer Lines	1,360	14	1,190	804	199	991
Additional Sewers for the Alcoa North Area (as delineated on							
*Carlton	Interceptor	483	1.2	396	252	62	334
	Pumping Station	43	6.2	80	16	3.8	76
Lateral	Sewer Lines	728	1.9	598	381	94	504
House Connection	Sewer Lines	430	5.0	381	254	63	318
Small Community Systems(1)							
*Townsend		2,010	61	2,050	727	181	1,870

TABLE II-22 (Continued)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
On-Lot System O&M for Existing Homes in Other Locations						
Conventional septic tank-absorption field systems	$ 0	$101	$738	$ 0	$ 0	$738
On-Lot Systems for Future Homes and Businesses in Unsewered Locations (1,360 systems)						
Conventional septic tank-absorption field systems (for 100% of these future homes)	2,110	20	1,840	495	123	1,720
					Estimated Grand Total(2),(3)	$ 9,230

(1)Estimated costs for small community systems are costs for the least costly, environmentally acceptable collection, treatment and disposal options. These options are small-diameter gravity sewers, extended aeration treatment plus filtration, wastewater disposal to the nearest river or stream, digestion and landspreading of sludge.

(2)The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.

(3)Costs for an on-lot or small community management district are not included for this alternative.

*Eligible for federal funding.

TABLE II-23

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 5
LIMITED 201 ALTERNATIVE

(All costs are presented in thousands of dollars)

		Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Future House Connections Associated with Wildwood Interceptor		$ 80	$ 0.8	$ 70	$ 47	$ 12	$ 58
Sewers for Periphery Area							
*Fairview	Interceptor	319	0.8	262	167	41	221
	Pumping Station	26	6.0	65	9.4	2.3	62
*Singleton	Interceptor	47	0.1	39	25	6.1	33
	Pumping Station	23	5.2	57	8.5	2.1	55
*Lakemont	Interceptor	57	0.4	49	30	7.4	41
	Pumping Station	13	5.1	48	4.7	1.2	46
Lateral	Sewer Lines	3,250	9.7	2,680	1,920	476	2,200
House Connection	Sewer Lines	1,360	14	7,190	804	199	991
Additional Sewers for the Limited 201 Service Area							
*Friendsville	Interceptor	1,230	3.0	1,010	645	160	852
	Pumping Station	334	34	511	121	30	483
*Shooks Gap	Interceptor	663	1.8	545	347	86	459
	Pumping Station	76	11	142	28	6.8	136
*Townsend	Interceptor	1,190	2.7	976	623	154	822
	Pumping Station	325	23	432	117	29	404
*Dellwood	Interceptor	246	0.6	201	128	32	169
*Flag Branch	Interceptor	363	0.8	297	190	470	250
Lateral	Sewer Lines	4,130	11	3,390	2,160	534	2,860
House connection	Sewer Lines	1,340	13	1,170	792	196	973

TABLE II-23 (Continued)

	Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
Small Community Systems						
None						
On-Lot System O&M for Existing Homes in Unsewered Locations (5,200 systems)						
Conventional septic tank-soil absorption systems	$ 0	$ 78	$567	$ 0	$ 0	$567
On-Lot Systems for Future Homes in Unsewered Locations(1)						
Conventional septic tank-absorption field systems (100% of these future homes)	1,610	16	1,410	378	94	1,320
				Estimated Grand Total(2),(3)		$13,000

(1) There are no small community systems proposed as part of this alternative.
(2) The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.
(3) Costs for an on-lot or small community management district are not included for this alternative.

*Eligible for federal funding.

TABLE II-24

ESTIMATED PRESENT WORTHS FOR ALTERNATIVE 6
FULL 201 ALTERNATIVE

(All costs are presented in thousands of dollars)

		Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
House Connections (Future connections to existing systems and connections to new interceptors)		$1,440	$ 15	$1,260	$ 851	$211	$1,050
Sewers for Periphery Area							
*Bungalow	Interceptor	390	0.6	320	200	50	270
*Fairview	Interceptor	610	1.4	500	320	79	420
	Pumping Station	78	11	140	28	6.9	130
*Singleton	Interceptor	260	0.6	210	140	35	180
	Pumping Station	78	5.4	100	28	6.9	93
*Lakemont	Interceptor	57	0.2	47	30	7.4	40
	Pumping Station	26	5.3	47	30	7.4	57
*Lakeview	Interceptor	100	0.3	82	52	13	69
	Pumping Station	26	5.3	59	9.4	2.3	57
Additional Sewers Included in the 201 Plan							
*Smoky View Estates	Interceptor	299	0.7	240	160	40	200
	Pumping Station	26	5.3	59	9.4	2.3	57
*Friendsville	Interceptor	2,000	4.5	1,600	1,020	250	1,350
	Pumping Station	360	34	540	130	32	510
*Shooks Gap	Interceptor	660	1.8	540	350	87	450
	Pumping Station	170	11	220	61	15	200
*Townsend	Interceptor	4,400	6.8	3,600	2,300	570	3,030
	Pumping Station	1,600	22	1,400	560	140	1,260

TABLE II-24 (Continued)

		Project Costs	Annual Operation and Maintenance Costs	Total Present Worths	Year 2000 Salvage Value	Present Worth of Salvage Value	Net Present Worth
*Dellwood	Interceptor	$ 440	$ 0.9	$ 360	$ 230	$	$ 300
*Flag Branch	Interceptor	585	1.2	480	310	77	400
*Crooked Creek	Interceptor	2,000	3.0	1,600	1,000	250	1,350
*Flag Branch to Wildwood to Regional WWTP	Interceptor	3,300	4.0	2,600	1,700	420	2,180
	Pumping Station	1,300	26	1,200	460	110	1,090
Lateral Lines for Both Existing and Proposed Sewers		3,250	9.7	2,680	1,920	476	2,200
On-Lot Systems(1),(2)		1,100	60	1,320	258	64	1,250
						Estimated Grand Total(3),(4)	$18,200

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(1) There are no small community systems proposed as part of this alternative.

(2) Costs include O&M for existing homes in unsewered areas and costs for future on-lot systems in unsewered locations.

(3) The estimated grand total does not include O&M costs for existing sewer lines or any costs at the Maryville WWTP resulting from future flows.

(4) Costs for an on-lot or small community management district are not included for this alternative.

- Salvage Value - Value of constructed facilities remaining at the end of 20 year planning period
- Present Worth - The amount of money which if invested now at a given interest rate, would provide the funds required to meet all project costs and operation and maintenance costs during the project life. Present worth costs allow an equitable comparison of facilities with different project costs, construction costs and service lives.

PART G - OPERABILITY EVALUATION

In addition to cost and environmental impacts, there are other considerations which are important to evaluate. For example, certain alternatives require small amounts of maintenance. Other alternatives may involve highly sophisticated technology or complex mechanical processes. All of these considerations which are not associated directly with costs or environmental impacts but which are associated with technical or engineering considerations are addressed in Part G as operability factors. The purpose of this section is to distinguish the major operability factors for each wastewater management alternative for the Blount County EIS study area.

The alternatives under consideration consist of varying combinations of on-lot systems, small community systems and centralized interceptors. The major operability considerations of these three types of systems are presented on Tables II-25, II-26 and II-27 respectively. Operability considerations do not completely eliminate any type of system from consideration in this EIS. The most potential problems appear to be related to the small community system alternative. The proper operation and maintenance of 35 separate systems would require more trained staff than would probably be affordable.

1. On-Lot Systems

On-lot wastewater technologies have been proven effective when properly sited and maintained and they are unsophisticated and relatively easy to operate.

TABLE II-25

MAJOR OPERABILITY CONSIDERATIONS FOR ON-LOT WASTEWATER SYSTEMS

	On-Lot Systems
Advantages	1. Systems are neither sophisticated nor complex. They also have proven effectiveness.
	2. Even soils with "fair" ratings can be suitable for conventional systems.
	3. Periodic maintenance is recommended only every 2 to 5 years.
	4. Energy and chemical needs are small even for mound systems.
Disadvantages	1. Variable soil characteristics are important.
	2. Consequences of improper operation can be significant.
	3. A large number of facilities would be utilized.
	4. Experience with sand mound systems is not available within the study area.
	5. Concerns with "poor" soils: communities of Lakeview, Lakeview Estates, Rockford, Edgewood Acres, Rocky Branch, Walland, Chilhowee View, West Maryville, Bungalow and Dotson.
	6. Concerns with "poor" soils: Seymour/Shooks Gap and Alnwick interceptor service areas.
	7. 54 percent of on-lot systems were reported by EPIC to be failing in Carlton; 41 percent in Cherokee Heights/Highland Acres.
	8. Specific reasons for failures can only be speculated without inspecting a number of systems.

TABLE II-26

MAJOR OPERABILITY CONSIDERATIONS FOR SMALL COMMUNITY WASTEWATER SYSTEMS

	Small Community Systems			
	Collection	Treatment	Disposal	Sludge
Advantages	1. Long service life: 40 to 50 years. 2. Gravity sewers are neither sophisticated nor complex. 3. Only infrequent inspection and maintenance is required, particularly for gravity sewers.	1. Systems have been effectively utilized for tens of years. 2. Nitrogen conversion and low sludge production are advantages of extended aeration systems. 3. Extended aeration and filtration are compatible forms of treatment.	1. Discharges to surface waters are quite reliable from an operations viewpoint. 2. Land application of wastewater is a form of water reuse.	1. Aerobic digestion is successful with sludge from extended aeration wastewater treatment facilities. 2. Drying beds require routine infrequent maintenance.
Disadvantages	1. Few pressure sewer systems and even fewer vacuum sewer systems have been installed and operated. None have been installed in eastern Tennessee. 2. Vacuum sewers have limited lift capacity; they are most applicable in flat terrain. 3. Sewer installation is a problem at the following communities due to shallow depth to bedrock: Lakeview, Lakeview Estates, Edgewood Acres and Chilhowee View. 4. With pressure sewers, energy would be required for pumps at households.	1. Weekly or more frequent operation and maintenance are required. Lack of staff makes this difficult. 2. Flow and temperature variations inhibit treatment performance. 3. Disinfection requires more careful operation and monitoring than other treatment processes.	1. Land application has many operational limitations; energy and equipment needs, site suitability, need for constant operation and agreements with landowners. However, climate should not prohibit the possibility of successfully operating land application systems within Blount County. 2. Local, Blount County experience with land application of wastewater is not available. 3. Proliferation of surface water discharges from small plants can cause widespread degradation of water quality if careful attention to operation and maintenance does not occur.	1. Drying beds and methods of disposing sludge have similar limitations as land application of wastewater but on a smaller scale. 2. Sludge applied to agricultural lands contains desireable nutrients but also heavy metals and other compounds uptaken by crops. 3. Effort and land requirements are higher for spreading liquid sludge than for landfilling dried sludge.

TABLE II-27

MAJOR OPERABILITY CONSIDERATIONS FOR WASTEWATER INTERCEPTORS

	Interceptors
Advantages	1. Systems are usually neither sophisticated nor complex to install or operate. They also have proven effectiveness. 2. Only infrequent inspection of pipelines is required; pumping stations would require a bit more monitoring. 3. Capacity can be available at the Maryville Regional WWTP to handle additional flows.
Disadvantages	1. Soils along interceptor routes have shallow depths at some locations; blasting could be required. 2. Maintenance access to small pipes (8 to 12 inches in diameter) is limited. 3. Electrical energy and backup pumps would be required at pumping stations. 4. Erosion and sedimentation control as well as maintenance of vehicle traffic flow would be particularly important for any interceptor installation along a river or stream.

Operability of on-lot systems is most significantly affected by soil conditions, assuming the systems are properly installed and periodically maintained. Many of the soils series within the Blount County study area are considered "fair" for installation of conventional on-lot systems (absorption fields, trenches or beds) based on USDA soil suitability ratings. A "fair" rating may be a concern, particularly because nearly every home within the unsewered portions of the study area utilizes conventional on-lot systems. Soil series with a "fair" rating are, however, judged to be suitable for conventional on-lot systems if the following steps are instituted:

- More stringent, State of Tennessee regulations (May 1979) are followed regarding residential lot sizes and distances of on-lot systems from water supply wells.
- Absorption areas for on-lot systems are provided in adherence to minimum State of Tennessee requirements if the home or business is located on soils with moderately slow permeabilities.
- A sand mound system is provided for soils with moderately shallow depths to bedrock or depths to the seasonally high water table.
- Systems are periodically inspected and maintained.
- A mat of subsurface organic materials forms to enhance wastewater treatment efficiencies within an absorption field.
- Slopes of land at each on-lot system are 12 percent or less.

Those soil series given a "fair" rating which have moderately slow (based on USDA ratings) permeabilities are Alcoa, Allen, Christian, Cumberland, Decatur, Dewey, Dunmore, Emory, Etowah, Fullerton, Hermitage, Minvale, Sequatchie, Waynesboro and Tellico. Those soil series given a "fair" rating which have moderately shallow depths to bedrock are Emory, Hayton and Tellico soils. Most of the study area is comprised of soils given a "fair" rating which have moderately slow permeabilities, therefore conventionally designed absorption areas, as specified in the revised State of Tennessee regulations (May 1979) are recommended for those areas. Sand mounds are recommended for the Emory, Hayton, Tellico, Fullerton and Neubert soils. For soils with poor ratings, sand mounds may be operable only after individual sites are surveyed.

Basically, any soil with three to four feet of unsaturated soil and a permeability requiring less than 120 minutes per inch is suitable for on-lot systems. More conventional absorption fields, beds and trenches are less costly than sand mounds and, therefore, recommended for soils with six feet or more of unsaturated soil depth and a permeability requiring less than 105 minutes per inch. The point here is that many site limitations can be overcome by incorporating one or more design modifications and by maintaining on-lot systems properly. The primary exceptions to this rule within Blount County are steep hillsides and floodplains.

Malfunctions and failures of existing on-lot systems have been identified and evaluated based on EPIC aerial photo interpretations and complaints presented to the Blount County Health Department. Based on this information, current problems typically result for one or more of the following reasons:

- Soils restrictions due to permeability, depth to bedrock or depth to seasonal high water table.
- Absorption fields are underutilized.
- Wastewater is not being evenly distributed across an absorption field.
- Absorption fields are not rested periodically nor otherwise operated or maintained on a regular basis.
- Flows to absorption fields have increased beyond design capacity.
- Septic tanks have not been pumped out in 5 years or more.
- System designs may not meet Tennessee regulations and/or EPA-approved guidelines.
- System installation techniques may not follow design specifications.

Without federal funding, the Blount County Health Department would presumably continue to manage on-lot systems. This system of management is based on addressing complaints, rather than providing periodic maintenance to avoid malfunctions. In this manner, serious problems are avoided if homeowners and businesses with on-lot systems recognize such problems and take the initiative to file a report to the County Health Department.

Installations of new systems would be conducted based on State of Tennessee requirements outlined in Section 6.1.3. of the Alternatives Development Technical Reference Document. Improved monitoring of on-lot system installers since 1979 has been reported by the Blount County Health Department (personal communication, 1981). No serious public health concerns have been attributed to on-lot systems within Blount County in the past.

2. Small Community Systems

The operation and maintenance needs of 35 small community systems would require a significant new effort on the part of local utility agencies scattered throughout the study area. Each small community treatment plant would need to be inspected regularly by trained personnel. Tasks for operating each small community treatment plant include:

- Remove debris and solids from bar screens and grit chambers respectively.
- Provide adequate detention time for effluent.
- Allow adequate but not excessive sludge quantities to promote efficient wastewater treatment. Some sludge may need to be removed periodically.
- Inspect pumps and other facilities with moving parts.
- Sample the effluent periodically and transport samples to a certified laboratory for analyses.
- Inspect chlorination facilities for safety and to be sure chlorine doses conform to requirements. Dechlorination facilities, if any, would require similar inspection.
- Backwash filters where filters are to be utilized.
- Inspect the outfall configuration at the nearby river or stream receiving the treated effluent. Periodic monitoring of effects of the effluent on the river or stream may be worth the necessary effort as well.

Sewer lines within a small community also may need to be flushed, particularly during the first few years of operation and during dry periods. All of these tasks would be required every one to three weeks for each of the small community systems.

Land application systems, however, have quite different requirements from those systems using discharge to streams or rivers. The operational advantages of land application are that it provides additional wastewater treatment prior to ultimately disposing the wastewater and that water can be utilized for irrigation or to supplement local groundwater supplies. In addition, the water and nutrients within wastewater applied to lands are reused by crops, in the case of agricultural lands, or reused for lawn sprinkling, in the case of golf courses or parks.

Operational limitations can result due to site conditions; maintenance requirements; storage requirements for treated wastewater; limitation on application during wet and cold periods; consequences of improper maintenance and equipment needs.

Site conditions required for slow-rate land application systems are basically the same as requirements for on-lot systems. Many types of soils considered marginally suitable for conventional, on-lot absorption fields are suitable for slow rate land application in which two to four inches of effluent are applied per week. As with on-lot systems, only soils located on hillsides or within floodplains are totally unsuitable. Detailed soil investigations at each of these land disposal sites would be required prior to implementation of land application systems.

3. Interceptor Sewer Lines

Sewer service for additional areas in the Maryville/Alcoa periphery could be installed only after primary considerations are handled such as:

- Sewer lines may not be able to be installed at locations with shallow depths to bedrock.
- Revised operations and expansion of the Maryville Regional Wastewater Treatment Plant may be needed particularly for periods when infiltration and inflow to sewer lines is high.
- If a number of pumping stations would be required, energy requirements in light of rising energy costs would need to be evaluated.

Sewer lines do not have intensive operation or maintenance requirements except at pumping stations. Design and installation activities would not be complex for the interceptor lines proposed in alternatives 4, 5 and 6; in most areas depths of soil to the water table and to bedrock are sufficiently nigh to avoid artificial site drainage or blasting activities. Perhaps the portion of the study area where interceptor installation would be most difficult is along the Little River between Walland and Townsend. Careful erosion control practices would be needed to protect the Little River from receiving sediment materials during construction.

Maintenance needs are infrequent and not sophisticated for interceptors. Occasional flushing of the pipelines, particularly during the first few years of operation, is likely to be needed to avoid settling of sediments, grease and other materials. Electrical energy would be needed continuously on a day-to-day basis at pump stations in order to pump wastewater to areas where gravitational forces can not transport the wastewater.

PART H - IMPLEMENTABILITY EVALUATION

Policies, planning and management issues associated with the six alternatives are addressed in this section on implementability. The intent of this section is in broad terms to answer the question--Is a particular alternative implementable in Blount County given prevailing local, state and federal policies, regulations and financing, and is it acceptable to the public?

1. No Federal Action Alternative

Past experience in the County demonstrates that developers are financially able to provide and install on-lot disposal systems or package plants and that the public is willing and able to pay the capital cost and operation and maintenance charges for conventional on-lot systems. In any case, these systems would be built over time with only a portion of the capital costs being incurred at any one time.

Expansion of wastewater collection into the peripheral area surrounding the cities of Alcoa and Maryville may not be as feasible, however. As shown in Section F, total project costs for sewer extensions including laterals and house connections would run over $5 million, all of which would need to be locally funded. The Blount County government is not likely to increase property taxes to secure the financing necessary to raise these funds and neither the County nor the MUB is able or willing to use yearly operating revenues for capital projects. In this situation, expansion will only take place on a piecemeal basis in those areas where developers or homeowners are able to provide financing.

There is also a key public policy question involved in the implementation of this alternative, namely the question of identifying the proper agencies to oversee sewer expansions and package plant operation and maintenance in the County. In the past, sewers in the County have been built by the County and then operated and maintained by the MUB. If the County is not willing to build additional sewers without federal funds, legal and procedural problems would be inherent if a city agency acted to construct sewers in the County. At a minimum, some form of memorandum of agreement would be needed.

There also remains the further issue of operation and maintenance of any package plants that are built. The question is whether private developers would be responsible for the life of the plant or whether the Blount County Health Department would assume responsibility. Perhaps with an expanded staff, the MUB could assume responsibility. These questions point to the need for the establishment of some form of intergovernmental agency, (city-county) with overall responsibility for water quality and wastewater treatment issues.

Beyond this key issue, the package plant and on-lot disposal systems included in this alternative would require permits from the state or County before installation is possible. It is probable that little problem should be encountered in securing the necessary permits for on-lot systems from the County health department because an adequate amount of land suitable for on-lot systems does exist in the study area to accommodate the projected year 2000 population. If elevated mounds are implemented, permitting will be somewhat more complex because these systems are not now being utilized within the EIS study area.

Permits for package plant discharges would also need to be acquired from the State of Tennessee. It is not possible to predict the probability of securing these permits other than to state that: (1) package plants would be required to provide secondary treatment, and these plants can probably be designed to meet any more stringent treatment levels necessary to comply with water quality standards; (2) stringent requirements to remove nitrogen or phosphorus from wastewater will most probably not be specified; (3) the Tennessee State Water Quality Control Division has reviewed wasteload allocations developed for surface discharges from the 35 small community systems. This modeling effort indicates that with secondary or in some cases greater than secondary treatment, water quality standards can be met; and (4) the state did grant a discharge permit for the Brookhaven Farms development on Nails Creek. The development has since been suspended by the developer.

The no federal action alternative basically represents a continuation of the status quo, a situation which has not yet been seen as unacceptable to many segments of the public. It is felt that continuation of this method of wastewater management in the future would meet with reasonable public acceptance. There are, however, certain exceptions: (1) Public reaction will be negative if expansion of wastewater collection from Maryville results in significant tax increases or in other significant costs being passed on to the public. (2) Those residents favoring increased commercial and industrial development may resist this alternative because it would limit these land uses in the future to areas with sewers or to situations where developers are willing and able to provide package plants. (3) Residents in those locations with numerous on-lot system malfunctions and failures are not likely to respond favorably to a proposal which does not directly address their problem.

2. On-Lot Systems Alternative

Implementation of alternative 2 is not seen as being limited by financial feasibility. On-lot systems have been the primary means of wastewater disposal in the study area and they have been afforded in the past. Even if sand mound systems are required in most areas in the future, this cost is not seen as unfeasible. The capital cost for a mound system is more than twice that for a conventional absorption system, however, it is still seen as affordable to most homeowners.

Federal funding would be available for renovation of on-lot systems thereby reducing the local public or private expenditures and further increasing financial feasibility. As an alternative technology, renovation of on-lot systems would be eligible for a federal grant of 85% of the total project cost. In addition, it would be funded from a separate funding pool for which projects are considered separately from conventional 201 grant applications. Since Blount County is fairly low on the priority list, this alternative basis for the grant award could greatly increase the likelihood of implementation.

The establishment of an on-lot system management agency would be necessary in order to be eligible to receive federal funds for the on-lot alternative. The responsibilities and organization for a management agency could be established with direction and assistance from EPA if desired. In general, such an agency could be responsible for:

- Implementation of repair or renovation of failing on-lot systems
- Review and approval of new system design and installation
- Inspection to assure proper operation and maintenance
- Enforcement of O&M requirements and system repairs when needed.

A number of different approaches are available for carrying out these actions. After inspection of newly installed systems, an operating certificate can be issued to cover a set time period after which reinspection is required. Reissuance of the operating certificate is then based on either inspection by a municipal employee or a written report or other documentation by a private septic system maintenance firm. If repairs are needed these are undertaken by the homeowner, certified, and then the operating certificate is reissued.

Another approach would place more responsibility on the managing agency. In this case, reinspections would simply be scheduled periodically and a municipal employee would perform the inspection and any maintenance or repairs if needed. The homeowner is then charged for the repairs. In some cases, inspection or certification fees are charged and these serve as the basis for a fund which supports maintenance or repair of systems. In this way, the management agency becomes a tool for sharing on-lot system costs within the community much as with service charges for centralized waste collection systems. Combinations as well as variations of these two schemes have also been used.

The start-up and initial administrative and project costs for a management agency have been included in the total project costs for this alternative, however, they are not federally fundable. Future costs would also be dependent upon local funding and the operating design of the management agency as discussed above. Annual costs would be affordable and long-term functioning should be financially feasible.

If an on-lot system management agency were implemented it would be necessary to establish a new County or city/county agency or else substantially augment the existing county health department. It is also likely that several new legal authorities would have to be granted to this agency by the county commissioners. The management agency would need a permanent funding source for operation as well as the power to place liens or use other powers to compel compliance with regulations adopted to cover proper operation and maintenance.

The public is likely to react favorably to continued use of on-lot systems since local residents are at least somewhat familiar with conventional on-lot systems through years of utilization. Sand mounds are not familiar, however, and this lack of familiarity plus their landscape visibility may result in some public reluctance.

The proliferation of on-lot systems throughout the County may be unacceptable to those of the public who see these systems as a cause of water quality and other environmental problems. Other persons may object to this alternative because it does not provide the impetus to commercial and residential development that other alternatives would, especially in Townsend.

The public in Blount County is not familiar with the on-lot system management district approach. Some people may view on-lot management warily for two reasons. First is the cost issue. On-going operating expenses for this agency would have to be raised in some manner from local sources. Also operation and maintenance costs for on-lot systems are likely to increase with more regular inspections and enforcement. If these costs are borne either directly by the homeowner or indirectly through management agency funds it will still result in increased expenses for County residents.

The second public concern results from the need for periodic inspections and the enforcement of operation and maintenance standards. In Blount County the public may be reasonably resistant to a new form of government control and more frequent visits by on-lot inspectors to individual homes. Agreements providing access to on-lot systems for operation and maintenance purposes would be needed.

3. Small Community Systems Alternative

The small community system alternative is by far the most expensive. Because of the greater costs for land disposal systems, such an option is significantly more expensive, even with a higher federal funding percentage. The total cost of this alternative clearly limits its financial feasibility, though it should be recognized that certain individual small community systems may be cost-effective.

The ability of the public to afford the required service charges is not evenly divided. The result of this is that small community systems proposed in some locations may not be affordable by the residents which are being served. For example, the Wildwood and Townsend census divisions had nearly 20% of all families in Blount County below the poverty level (1970 data). In Townsend the income of nearly half of all families was under $6,000 in 1970. Although the family income has undoubtedly increased in the past 12 years, it is still lower in these areas, with a correspondingly greater likelihood of financial hardship.

The implementation of this alternative would be greatly hindered by the position of Blount County on the Tennessee priority list. Blount County projects are currently number 275 on the state's B list which would indicate no funding availability during the 20 year planning period. This position reinforces EPA's policy of giving funding priority to projects which have exhibited a current need based on existing water quality or public health problems. This project has exhibited no such need.

The public policy issues affecting implementation of this alternative are basically the same as those discussed above for alternatives 1 and 2, namely the lack of an agency in the County with the jurisdiction, manpower or budget to implement, operate or maintain the facilities. In addition to the necessary authorities for such an agency as discussed above, the small community system alternative would add the probable requirement for condemnation powers. If the land disposal option is chosen for each of the 35 small communities, a total of over 200 acres would be needed for land disposal sites. These sites could probably be most effectively managed and operated if they were purchased by the managing agency and then leased back to a farmer or other land owner if continued farm use is feasible. Although it is likely that a reasonable purchase agreement could be arranged, condemnation could be needed if some site areas contain few feasible sites and owners resistant to selling.

Because of the proliferation of systems in this alternative, the acquisition of necessary permits or approvals would be an extensive process. If the surface discharge option is chosen for all 35 areas, it would be necessary to secure 35 individual discharge permits. The analyses necessary to approve these permits could be lengthy and might require additional time consuming water quality monitoring and data collection.

In cases where a number of discharges are proposed for the same stream segment, some time savings could be possible.

Preliminary wasteload allocations have been run for each of these discharge points. This preliminary work indicates that with secondary or in some cases greater than secondary treatment, it is feasible to discharge wastewater in limited amounts to these streams without violating water quality standards.

If land application is the preferred method of discharge, a permit for each site and a detailed data collection and analysis process would be required. These permits, termed State of Tennessee "no-discharge permits" are evaluated on a basis similar to National Pollutant Discharge Elimination Systems (NPDES) permits. In addition, these permits consider impacts to groundwater as well as potential surface water impacts from ponding and overland flow. The factors considered in making this evaluation include soils, geology, groundwater flows and runoff. For the level of detail required, new on-site data collection may be necessary and borings for geological data might be needed.

At the present time the state has not set specific levels of wastewater treatment related to certain groundwater quality requirements. The approach to date has been to require a level of treatment at least equivalent to conventional secondary treatment.

Along with the permit authorization there would also be some requirements for monitoring of effluent quality and resulting groundwater and surface water effects. Some wells to monitor water quality may need to be drilled and sampled regularly.

Public acceptance of the small community alternative would largely be a function of the disposal option selected and the level of service charges to residents needed to cover operation and maintenance.

Most residents in Blount County are familiar with conventional treatment plants using surface discharges, therefore, the technology itself should not concern the public or present acceptability issues. However, there already is local concern about water quality in the Little River and threats to its use as a source of water supply and recreation. Because of these concerns, it is likely that the proliferation of treatment plant discharges within the Little River basin will create public resistance.

Land disposal on the other hand would have the advantage of eliminating discharge of wastewater to the Little River and other local water bodies. In this case, however, the public in Blount County is largely unfamiliar with land application technology and as a result may be resistant to the approach. It is also possible that some objections may be raised to the purchase of land for both 35 small treatment plants and land disposal sites. If condemnation is required to secure these sites adverse public reaction is highly probable.

The service charges needed to support these systems is also likely to cause public concern. Based on the 1980 populations served it is estimated that yearly user charges could exceed $300 per household for areas served by small community systems. This amount could clearly result in financial hardship for many residents and is not seen as publically acceptable.

4. Suburban Maryville-Alcoa Alternative

This is one of the least costly of alternatives being evaluated. It should be possible to meet local costs without placing a hardship upon local residents.

Because of the limited extent of this alternative it could probably be implemented in the same manner as other interceptor sewer projects in the County; namely, construction would be funded and undertaken by Blount County with the MUB assuming responsibility for operation and maintenance. This is not an ideal method of implementation but it has been shown to work for projects of limited scope. Future reliance on this approach, though, would require the willingness and ability of the MUB to assume responsibility for operation and maintenance.

The Maryville Regional WWTP already has a discharge permit. However, the State of Tennessee Water Quality Control Division may choose to revise the existing permit based on the increased level of discharge in the future.

The implementation of this alternative would be greatly hindered by the position of Blount County on the Tennessee priority list. Blount County projects are currently number 275 on the state's B list which would indicate no funding availability during the 20 year planning period. This position reinforces EPA's policy of giving funding priority to projects which have exhibited a current need based on existing water quality or public health problems. This project has exhibited no such need.

The Blount County public is familiar with interceptor sewers and pump stations and is likely to accept their implementation. If federal funding is secured, construction costs should not present an acceptability problem either. As with other alternatives which include federal funding, the key public acceptability issue may be the level of service charges needed to cover annual expenses. As the service area for this alternative is relatively densely settled it is fairly cost-effective to provide service.

5. Limited 201 Alternative

Total net present worth is about $13 million. The total local share of project costs would be about $13.5 million. Unless other grant funds are secured, the entire share would have to be supported through bond issues or other sources. The feasibility of providing capital financing from increased property assessments is unlikely. However, if the tax increase is minimal this may be a feasible approach to securing these funds. A special taxing district limited to the service area may be more feasible and could also be considered. In this way, the total cost would be divided over fewer households but only those directly benefiting would be charged. Hook-up fees to cover the local share could be quite high and would probably discourage implementation of the system. If the entire local share is financed, annual costs including debt service and operation and maintenance costs are estimated to be about $1.6 million.

The implementation of this alternative would be greatly hindered by the position of Blount County on the Tennessee priority list. Blount County projects are currently number 275 on the state's B list which would indicate no funding availability during the 20 year planning period. This position reinforces EPA's policy of giving funding priority to projects which have exhibited a current need based on existing water quality or public health problems. This project has exhibited no such need.

The public policy issues for this alternative are basically the same as those discussed for other alternatives. Because of the greater extent of interceptors and the larger overall scale, the question of MUB's willingness to assume daily responsibility becomes a more significant issue. This alternative would add about 3,000 new customers by 2000 along with over 35 miles of interceptors and numerous pumping stations. This would greatly expand MUB's operation and maintenance responsibilities.

The public in Blount County is familiar with interceptor sewers and pump stations and should not be resistant to their implementation. As with other interceptor alternatives which do not involve unfamiliar or innovative technologies, the key issues to the public will be locations of service areas and costs to homeowners and businesses. The yearly service charge in sewered areas is estimated to be about $250 per household assuming a 1980 service area population of about 6800 households. This cost is significantly higher than existing yearly expenses for on-lot systems and may not be acceptable to the public.

This alternative involves the provision of an intensive network of interceptor sewers to the furthest edges of the study area. Although planned only to serve growth in existing developed areas, some among the public may react adversely to this proposal, seeing it as a major stimulus for growth and disruption to largely rural areas. Others, however, will see it as an alternative likely to attract future commercial and industrial jobs into the County.

This alternative is basically consistent with all pertinent plans and policies including the land use plan for Blount County. Although most of the areas proposed for sewer service are planned for residential use by the plan, it should be recognized that the availability of public sewers could permit growth levels more intense than those proposed by the plan.

6. Full 201 Alternative

Total net present worth for this alternative is estimated to be about $18.2 million. The estimated local share of project costs assuming 75% federal funding would be nearly $12 million. As discussed regarding other alternatives, various sources can be considered for the local share of project costs, some more feasible than others. As the total local cost of this alternative is farily high because of high project costs and only 75% federal funding, financial feasibility is questionable unless other grants can be secured.

The implementation of this alternative would be greatly hindered by the position of Blount County on the Tennessee priority list. Blount County projects are currently number 275 on the state's B list which would indicate no funding availability during the 20 year planning period. This position reinforces EPA's policy of giving funding priority to projects which have exhibited a current need based on existing water quality or public health problems. This project has exhibited no such need.

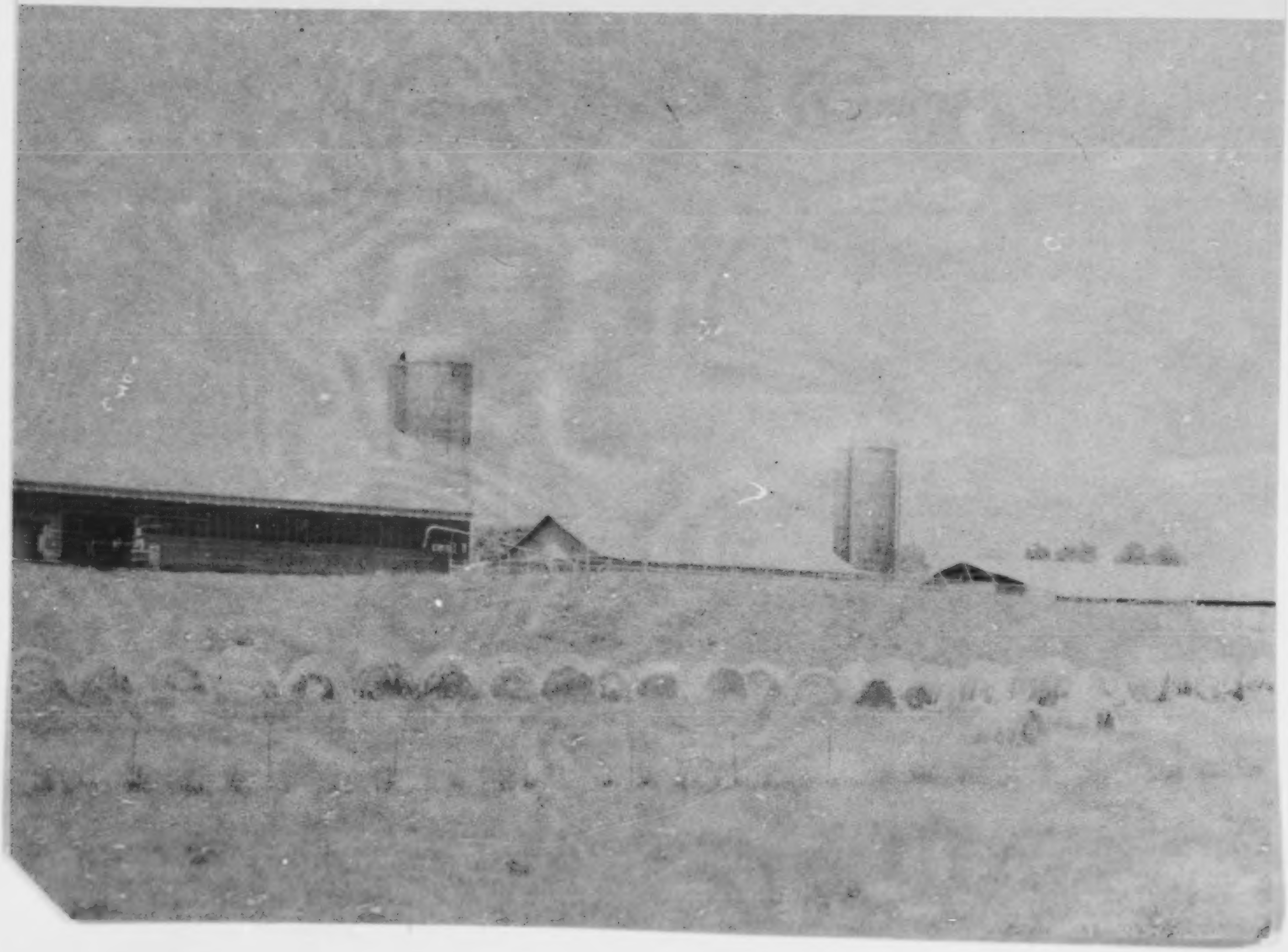
The public policy issues are the same for implementation of this alternative as for other interceptor alternatives. The question of a feasible implementing agency remains. No unique permit problems are foreseen for this alternative.

The discussion presented above for the limited 201 alternative applies equally to this alternative in most respects. This alternative differs in the one key respect that it will also provide service for extensive areas of new development in largely rural areas of the County. Some rural residents as well as advocates of limited growth have already voiced objections to this aspect of the 201 Plan. They may also perceive significant future monetary costs to provide other services to these areas. Because of these issues, some public resistance to this alternative has already arisen. It should also be recognized, though, that the system of interceptor sewers proposed may have support from many other members of the public who see the facilities as an important aid in attracting intensive commercial and industrial development to the County.

Service charges for this alternative would be about $190 per household annually. Though project costs for this alternative are slightly higher than for alternative 5, because of a larger service area population, costs per user are lower.

Alternative 6 is not consistent with the approved Blount County Land Use Plan. It would serve residential development in areas which the plan has proposed for agriculture, forests and open space.

CHAPTER 3



CHAPTER III

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND MITIGATIVE MEASURES

PART A - INTRODUCTION

This chapter summarizes the existing natural and man-made environment of the study area, discusses the environmental impacts of the alternatives and proposes possible measures to mitigate these impacts. The purpose of the environmental setting summary is to establish the existing baseline conditions in the area. The impacts of the various alternatives are gauged against these existing conditions. The discussion is organized to present the most critical potential impacts first. Measures developed to mitigate the impacts presented in this chapter are then discussed.

PART B - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

1. Population and Land Use

Blount County has shown a history of fluctuations in population growth with periods of significant growth interspersed with phases of more moderate population increases. Over the past twenty years, the total population of Blount County has increased by approximately 20,000 people.

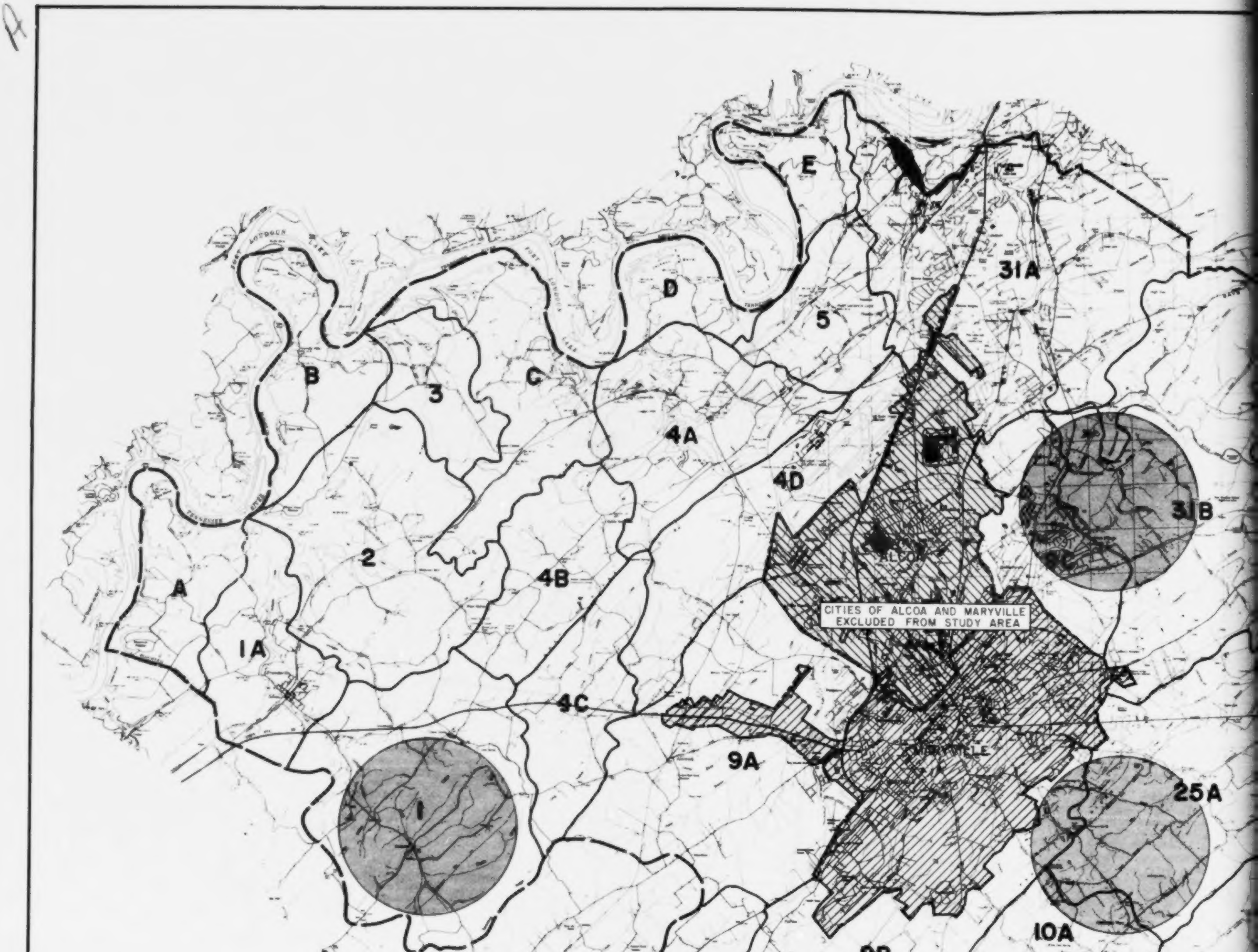
The study area for this EIS encompasses the northern 2/3 of Blount County with the exclusion of Maryville and Alcoa and unpopulated areas contained within the Smoky Mountains National Park. The 1980 permanent population for the study area was 29,950. This is projected to increase to a total of 35,780 in the year 2000.

Population in the study area was disaggregated into 44 districts based mainly on drainage patterns but also reflecting political boundaries. Table III-1 presents the present and projected populations for the 44 districts whose boundaries are shown on Figure 3-1.

PRESENT AND PROJECTED PERMANENT POPULATION FOR BLOUNT COUNTY DISTRICTS

DISTRICT	1980	1985	1990	1995	2000
A	59	61	61	62	64
B	200	211	223	235	247
C	689	808	819	830	838
D	166	175	181	189	196
E	151	158	164	170	176
1	883	919	952	989	1,020
1A	764	782	793	801	801
2	739	767	794	820	847
3	98	100	100	101	102
4A	1,110	1,290	1,430	1,530	1,590
4B	322	337	350	363	376
4C	657	687	707	722	731
4D	689	800	888	949	987
5	824	900	962	1,000	1,020
6	1,100	1,140	1,160	1,140	1,100
9A	3,360	3,800	4,130	4,340	4,430
9B	1,290	1,460	1,600	1,700	1,760
9C	3,910	3,980	3,970	3,930	3,820
10A	520	539	555	566	573
10B	127	128	128	130	131
11	174	174	172	172	172
12	41	40	38	38	37
13	129	138	145	152	160
14	10	10	10	10	10
17	178	196	221	242	264
18	660	888	902	912	925
18A	102	105	105	107	109
19	145	161	177	195	211
20	66	67	67	68	69
21	118	121	121	124	127
22	8	8	7	7	7
23	210	216	216	222	228
24	189	194	194	197	201
25A	1,420	1,500	1,560	1,620	1,660
25B	635	666	696	725	758
26	763	799	838	876	915
27	134	134	131	131	129
28	268	280	292	304	316
29	634	662	689	716	743
30	1,800	1,940	2,070	2,180	2,270
31A	1,770	1,900	2,010	2,090	2,160
31B	1,920	2,090	2,220	2,330	2,410
31C	790	827	861	896	931
31D	129	142	153	167	178
EIS STUDY AREA TOTAL	29,950	32,300	33,870	35,040	35,780

A


E
D
31A
5
B
3
C
4A
4D
31B
ALCOA
2
4B
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
A
1A
4C
9A
MARYVILLE
1
25A
10A
9B
6
10B
12
11
13
LEGEND
SAMPLE AREA

1 B

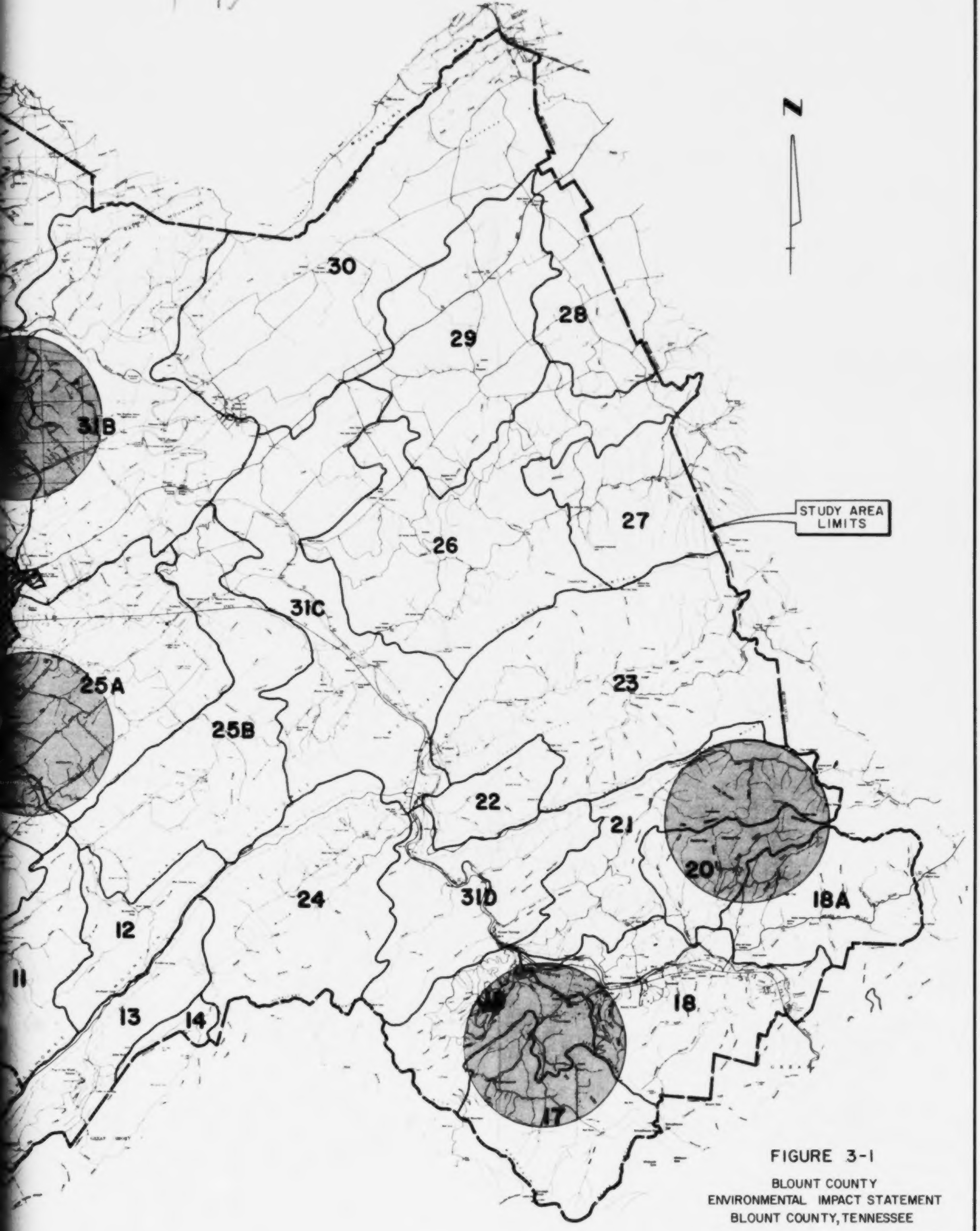

N
30
28
29
31B
27
STUDY AREA LIMITS
26
31C
25A
23
25B
22
21
20
18A
12
24
31D
11
18
13
14
17

FIGURE 3-1

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

POPULATION DISTRICT BOUNDARIES

7000 0 7000 14000
SCALE IN FEET

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

In addition to the permanent residential population, a projection was also made for the number of overnight accommodations (motel rooms and campsites) to exist in Townsend by the year 2000. This analysis concluded that in 2000 there will be about 1,500 overnight accommodations in Townsend. During peak tourist periods, the accommodations can be assumed to be filled to capacity with three persons per accommodation. The projection methodologies, together with comment letters from the Blount County Planning Commission (BCPC) and the East Tennessee Development District (ETDD) can be found in Appendix A of this EIS.

Existing land use in Blount County was inventoried by the BCPC in the land use plan developed in 1976. Based on a review of the land use map presented in that report, land use within the study area is primarily agricultural and open space with small amounts of residential land use following roads and clustered next to Alcoa and Maryville. Some commercial land is concentrated in the small towns. Most of the more intensive, urbanized development is contained within Alcoa and Maryville which are outside of the study area. Table III-2 presents data on land use within the County based on a visual inspection performed in 1975. As that data shows, nearly half of the single-family dwellings, most of the multi-family residential and nearly 2/3 of the commercial and service establishments were located in Maryville and Alcoa.

More recent land use information is available from data developed by EPA's Environmental Photographic and Interpretation Center (EPIC). This information based on interpretation of 1980 aerial photography, is presented on Figure 3-2. As this map shows, a large portion of the study area is still open, either agricultural or forest land. In the areas more removed from Maryville and Alcoa, residential land use is still found primarily along the roadways. There are, however, significant areas of residential development found adjacent to the Maryville and Alcoa city limits showing an expansion of residential development in this area since 1975.

Information on future land use in the study area is not extensive because of the low level of planning activity and lack of land use control

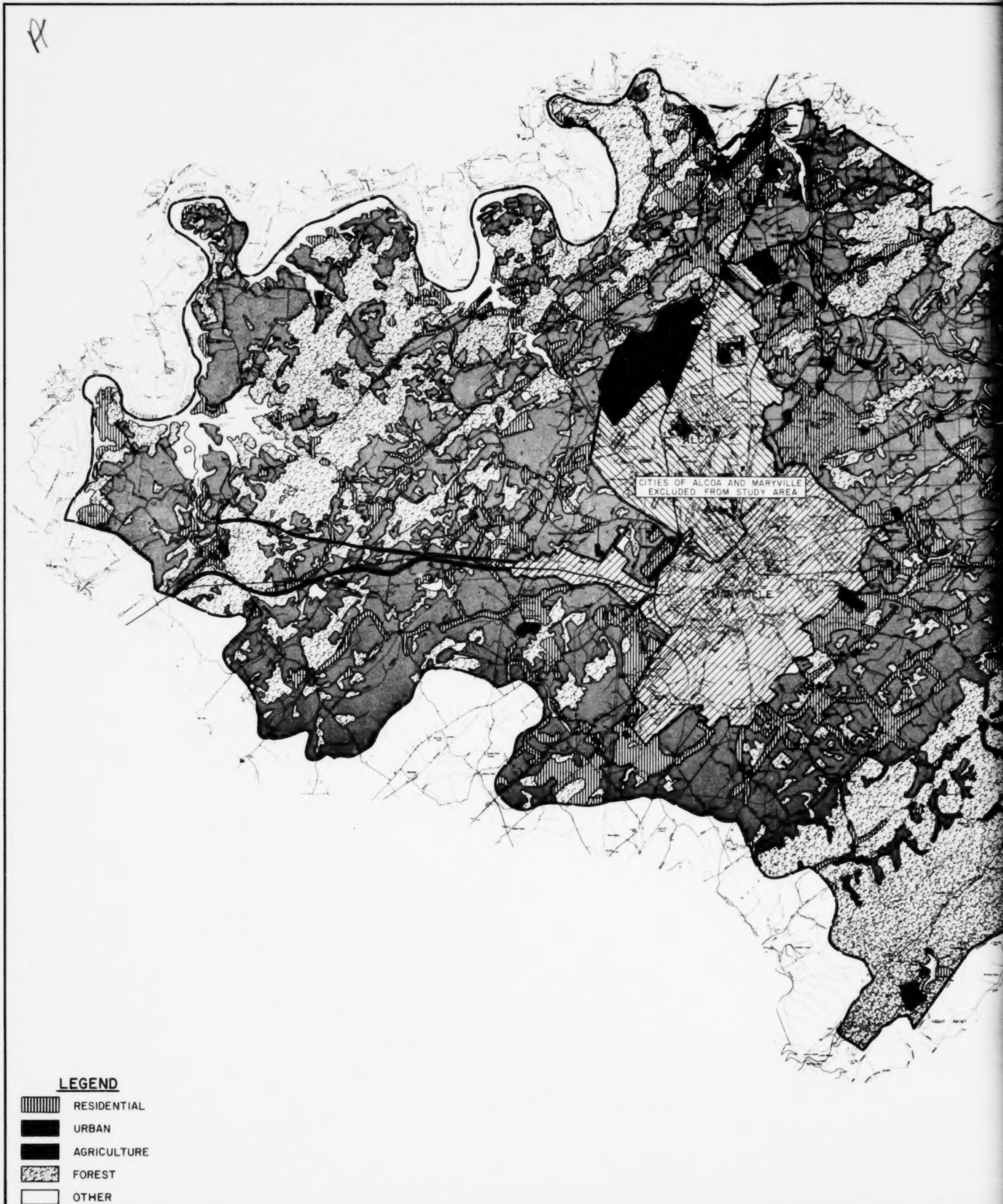
TABLE III-2

EXISTING LAND USE DATA 1975
BLOUNT COUNTY, TENNESSEE

USE CATEGORY	FREQUENCY OF LAND USE BASED ON ON-SITE VISUAL INSPECTION						
	ALCOA-MARYVILLE	BINFIELD DIVISION	FRIENDSVILLE DIVISION	LANIER DIVISION	TOWNSEND DIVISION	WILDWOOD DIVISION	COUNTY TOTAL
Single Family Residence	6,436	1,097	1,435	1,560	1,367	1,388	13,283
Multi-Family Residence	85	2	--	--	1	2	90
Mobile Home	1,204	125	206	220	257	170	2,182
Commercial & Service	221	44	21	33	45	24	388
Recreational Commercial	6	2	--	2	11	1	22
Industrial & Manufacturing	18	4	6	7	4	--	39
Resource Extraction	2	--	7	--	--	--	9
Public and Institutional	111	16	38	50	51	35	301
Transportation, Communication, & Utilities	19	1	3	1	6	4	34
TOTAL	8,102	1,291	1,716	1,873	1,742	1,624	16,348

SOURCE: Tennessee State Planning Office, Blount County Land Use Survey, 1975.

R


CITIES OF ALCOA AND MARYVILLE
EXCLUDED FROM STUDY AREA
ALCOA
MARYVILLE
LEGEND
▥ RESIDENTIAL
■ URBAN
■ AGRICULTURE
▨ FOREST
☐ OTHER

1 B

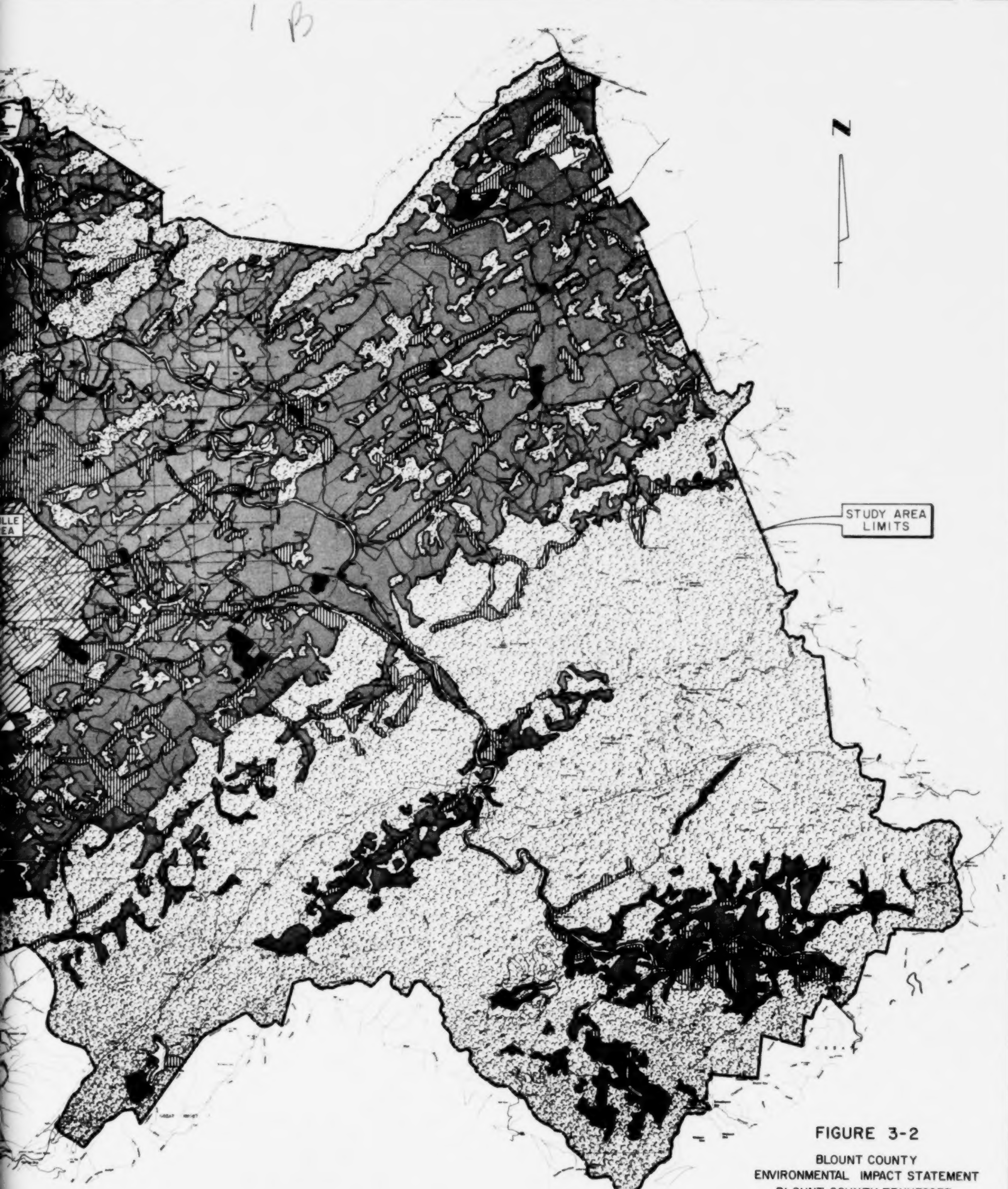


FIGURE 3-2

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

EXISTING LAND USE

7000 0 7000 14000
SCALE IN FEET

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

within the region. Future land use for Blount County has been studied by the East Tennessee Development District and a regional land use plan was prepared in 1979, (ETDD, 1979). This plan is for a 16 county area and is designated to meet broad regional needs. In addition, there is no implementation authority behind the plan because of legislative limits on the authority of the ETDD. This plan, however, is the only source of quantified land use projections. The forecast set out in this plan indicates that total developed acreage in Blount County will reach nearly 24,000 acres by 1995. This will amount to an increase of over 31% since 1970 (ETDD, 1979). This increase will be fairly uniform across the four categories of developed land use, with an increase of approximately 30% in all categories except manufacturing where a lower, 17% is expected (ETDD, 1979) (Refer to Table III-3). Citizen and governmental efforts at future land use planning have attempted to reckon with this potential level of growth while minimizing associated social costs and government expenditures.

The Blount County Planning Commission has also studied land use issues and policies in the County and has prepared a future land use plan (BCPC 1976). This plan has only recently been approved by the County Planning Commission. The plan addresses the entire County and no other data source specifically addresses land use in only the EIS study area. For this reason, the discussion of land use, though directed at the study area, is based on the County-wide land use plan.

The primary issue addressed in the County land use plan is growth management and the need to accommodate future growth and development in areas where urban support facilities already exist or can be economically provided. The plan advocates future growth that is systematic, logical and at a pace that local government can accommodate. Historically, the area has had to cope with a high growth potential coupled with limited land resources; existing development which often failed to analyze the land's capability to support certain land use activities; unwise development decisions with regard to man-made factors; strong competition between various uses for developable land and the lack of County land use planning (BCPC 1976).

TABLE III-3

BLOUNT COUNTY CHANGES IN DEVELOPED LAND USE CATEGORIES 1970-1995

	ACRES		
	1970	1995	% Inc.
Residential	8,500	11,190	32
Commercial	380	500	32
Manufacturing	1,210	1,400	16
Public and Quasi Public	7,960	10,490	32
	18,050	23,580	31

Source: East Tennessee Development District. April 1979. Land Use Plan 1979-2000.

Two other concerns related to this issue are the potential for explosive recreational/tourist growth in the Townsend area and maintenance of water quality in the Little River. The Townsend-Tuckaleeckee Cove area is adjacent to the Great Smoky Mountains National Park and along one of the Park's main entrances. The town of Gatlinburg in Sevier County to the northeast is similarly located and it has grown into a major destination resort complex based on the attraction of the Park. Gatlinburg is the Park headquarters and has better highway access, nevertheless, speculation has continued for many years that Townsend would inevitably grow as Gatlinburg has. The area has a great deal more developable land than Gatlinburg (BCPC, 1976) and it has been generally assumed that once adequate water and sewer facilities and better surface transportation were developed growth would follow.

The concept for future land use provided for by the County Planning Commission reflects historic development patterns by assigning future high density residential growth to the Maryville/Alcoa region. Development has traditionally been a function of employment opportunities in these areas and in Knoxville, particularly in the aluminum industry. For this reason the most intense development has occurred in the north central portion of the study area, mainly in and around Maryville and Alcoa. A main share of future growth will continue to take place in this area because of the employment opportunities, existing services and transportation patterns.

The overall land use pattern presently established calls for a nucleus of development in Alcoa/Maryville containing most commercial and industrial employment and the bulk of high density residential development. This area is surrounded by open space and agricultural lands and a number of rural residential "satellite" development areas. These areas would include largelot residential development at a minimum one acre lot size. Compatible agricultural use and open space would be encouraged in these areas while commercial development would be concentrated in existing incorporated towns and small rural centers such as Townsend, Friendsville, Wildwood and Shooks Gap (BCPC, 1976).

This development plan expresses a preferred development pattern that would address the major issues discussed above. Especially considering the lack of development controls, it does not dictate what the exact future use of land will be. Even without controls, however, it is probable that this model will at least in part be realized since ongoing development pressures are likely to induce continued residential growth in the areas adjacent to Alcoa and Maryville.

Implementation of the no federal action alternative, the Maryville/-Alcoa suburban alternative, the package plant alternative and the limited 201 alternative would support this projected land use pattern and population distribution. Under these alternatives, sewer service would be provided in the areas projected for the most development which include suburban Alcoa/Maryville and Townsend.

It should be pointed out that the provision of public sewers in the limited 201 alternative does provide service through some areas designated as rural residential and could result in a level of development much more intense than that forseen by the land use plan. It is also important to note that the interceptors proposed for construction in all alternatives where interceptors are involved are designed to flow half full at peak flow. This means that extra capacity would be available unless population was limited by land use controls or other means.

The public sewers provided in the 201 alternative provide for much more capacity in the rural areas of Blount County than the population projection and land use plan provide for. The service areas proposed are so large that the result would be inducement of excessive growth and sprawl over hundreds of acres. This excessive growth potential could result in development of lands planned for agriculture, forest or open space in the County plan, particularly in Townsend, but also to a lesser extent in the eastern and southeastern portions of the County adjacent to Maryville and southwest of Mentor.

The implementation of the on-lot alternative would probably lead to slightly lower densities in the urban residential category planned for the

Maryville/Alcoa periphery than would result from the sewer system alternatives. Also, the clustering of small developments in the rural areas would not be encouraged by this alternative. In general, however, this alternative does support the development pattern outlined in the Blount County land use plan.

2. Surface Water Resources

Information gathered by the Tennessee Division of Water Quality Control (TWQC) and the special sampling study done as part of this EIS both indicate water quality conditions to be good in Blount County. Water conditions at all of the sampling sites were within state and federal standards for dissolved oxygen, pH and temperature, though temperatures at most sites were above the state limits for trout streams.

Of primary concern in the County is the water quality of the Little River. This importance is based on the fact that the Little River is the source of water supply for almost the entire County. The Little River begins in the Great Smoky Mountains National Park and flows through Blount County from the Townsend area to the northeast part of Alcoa where it joins the Tennessee River. The TWQC has not allowed any surface water discharges into the Little River because of its current pristine condition, its importance as a water supply resource and its recreational value.

Most of the tributaries to the Little River are also free of surface discharges although the TWQC did approve a discharge on Nails Creek for a package plant. The water quality in these creeks is generally good with the exception of some problems caused by agricultural runoff.

The alternatives involving small community systems could potentially impact the water quality of area streams through surface water disposal of treated effluent. This impact would occur at specific sites and would be most severe at sites that are located near stream headwaters. In these locations increased biochemical oxygen demands (BOD_5) and nutrient loadings would result because sufficient dilution of effluent would not be achievable. This impact would be especially severe during low flow stream periods. While the state of Tennessee would assign permit levels based on waste load allocations which should prevent the violation of water quality standards, system malfunctions could have serious impacts. Such system malfunctions can be expected under the small community system alternative.

Increases in erosion and sedimentation following construction of pressure or gravity sewers can increase stream sediment loads which would, in turn, lead to accelerated channel erosion. This impact would be most severe where slopes are steep and vegetation is difficult to establish, at pipeline-stream intersections and during periods of intense rainfall.

The Little River corridor is particularly vulnerable to construction-related impacts because of steep slopes, bedrock outcrops and constricted pipeline alignments. In the area of proposed pipeline construction between Walland and Townsend, any construction could increase surface erosion, resulting in channel scour and increased sediment yield of local streams and rivers aggrevating water quality conditions. Any deforestation during the construction process would expose stream segments to direct solar radiation causing significant increases in stream temperature during clear days. As water temperature increases, its oxygen-holding capacity decreases, rates of chemical processes are accelerated and BOD levels increase. Depending on the alignment selected in this area many or all of these impacts could result from construction of the interceptor proposed in both the 201 and limited 201 alternatives. However, a right-of-way for a 6-inch water main has recently been completed in this area and an abandoned highway on the north side of the river could provide a relatively level construction area for the interceptor.

Because of the proximity of the interceptor alignments to other streams similar impacts may occur between Friendsville and Alcoa and Wildwood and Shooks Gap. Pipeline construction in these areas would cross numerous streams and areas where slopes are excessive and soils are unstable.

Significant water quality and quantity impacts may result from increased development and associated land use changes in service areas surrounding proposed interceptors. Table III-4 and III-5 give expected loading changes from 1980 to 2000 for total nitorgen, total phosphorus, BOD_5 and suspended solids for sewered and nonsewered areas under the two 201 alternatives. These alternatives have the greatest potential for impact because of the additional population which could be supported.

Some malfunctioning on-lot disposal systems have been identified within the study area based on an aerial photo interpretation study conducted by EPA's Environmental Photographic and Interpretation Center (EPIC). In determining the existence and extent of these failures, EPIC differentiated surface failures and seasonal failures. Surface failures were characterized by unusually lush growth of vegetation above subsurface drainage fields and by one or more dark spots on aerial photos where vegetation had been killed. The presumption was that the vegetation had died due to overabundance of moisture from surfacing wastewater effluent. In properly operating on-lot systems, wastewater will percolate downward through the absorption field rather than rising to the surface. Seasonal failures were characterized by unusually lush vegetation growth and signs that effluent would rise to the soil surface during wet periods.

Many of the malfunctions identified were of the seasonal type and would probably only result in occasional high soil moisture levels. The surface failures, however, could result in odors, plumbing back-ups and other problems. At this time though, no significant water quality impact or associated environmental problems were seen to result from these failures or any other source.

Although the interceptor alternatives would eliminate a number of the failing on-lot systems, this would not necessarily lead to an improvement in water quality. In addition, implementation of the on-lot system renovation program included in alternative 2 would actually eliminate a greater number of malfunctioning systems.

TABLE III-4

Nonpoint Pollution Loading Changes from Year 1980 to Year 2000 for Sewered and Non-Sewered Areas for the Limited 201 Alternative

Study Area Subunit	Water Quality Parameter (lb/yr)			
	Total Nitrogen	Total Phosphorus	BOD_5	Suspended Solids
Townsend/ Kinzel Springs				
Sewered	(+) 35.9	(+)1,619.1	(+)2,288.2	(-)35,573.2
Non-Sewered	(+) 11.2	(+) 194.1	(+) 54.5	(-) 7,477.1
Eastern County				
Sewered	(+) 50.5	(+) 712.6	(+)2,556.6	(-) 4,915.6
Non-Sewered	(-) 4.7	(-) 96.6	(+) 219.0	(-)16,453.8
Nails Creek				
Sewered	(-) 7.3	(+) 364.6	(+) 102.2	(-)10,191.0
Non-Sewered	(-) 0	(-) 0	(-) 0	(-) 0
Northwestern County				
Sewered	(+) 65.4	(+) 508.0	(+) 485.7	(-) 182.9
Non-Sewered	(-) 7.8	(+) 512.2	(+) 143.4	(-)13,612.8
Maryville/Alcoa Periphery				
Sewered	(+)1,397.4	(+)7,181.0	(+)9,220.2	(-)96,631.0
Non-Sewered	(+) 47.6	(+)2,133.8	(+)1,892.4	(+)54,420.5

Note: This table and the one following present estimated changes in total nonpoint source loads based on the following assumptions. First, loading rates for different land use categories included in sewered and non-sewered areas were typical figures derived from a literature review and can be considered average for each land use category. Second, 1980 land use distribution was based on the land use data obtained by EPIC aerial photo interpretation. Third, year 2000 land use distribution was obtained by dividing the change in population by present population densities in urban and rural residential areas. Visual inspection of the 1980 land use map was used to estimate what changes would occur in each existing type of land use to accommodate future population. The final acreage change was multiplied by the appropriate nonpoint loading rate.

TABLE III-5

NONPOINT POLLUTION LOADING CHANGES FROM YEAR 1980 to YEAR 2000 FOR SEWERED AND NON-SEWERED AREAS FOR THE 201 ALTERNATIVE

	Water Quality Parameter (lb/yr)			
Study Subunit	Total Nitrogen	Total Phosphorus	BOD$_5$	Suspended Solids
Townsend/ Kinzel Springs				
Sewered	(+) 63.6	(+) 2,133.0	(-) 1,411.0	(-) 44,522.0
Non-Sewered	0	0	0	0
Eastern County				
Sewered	(-) 3.4	(+) 167.5	(+) 46.8	(-) 4,682.7
Non-Sewered	(-) 3.1	(-) 118.5	(+) 212.8	(-) 15,501.6
Nails Creek				
Sewered	(+) 65.3	(+) 858.1	(+) 799.3	(-) 8,486.0
Non-Sewered	(-) 0	(-) 0	0	(-) 0
Northwestern County				
Sewered	(+) 17.7	(+) 11.5	(+) 141.5	(+) 799.5
Non-Sewered	(+) 86.0	(+) 998.4	(+) 277.0	(+) 2,162.0
Maryville/Alcoa Periphery				
Sewered	(+) 301.9	(+)13,581.6	(+) 4,562.0	(-)231,575.7
Non-Sewered	(+) 39.7	(-) 2,071.3	(+) 1,892.4	(+) 54,420.5

3. Groundwater Resources

Groundwater occurrence in Blount County shows distinct difference between the Blue Ridge and the Valley and Ridge physiographic provinces. Wells in the poorly permeable rocks of the Blue Ridge Province yield only a few gallons per minute, primarily from fractures. Only in the large, alluvium-filled stream valleys can moderate groundwater development occur. Many small springs with low discharges are found.

In the Valley and Ridge Province, groundwater is generally abundant. It is generally found in solution channels in the calcareous rocks. Water supplies can be developed if water-bearing zones are delineated or if wells are located in topographic lows near permanent streams. Springs are also a major source of groundwater in this part of the County, some yielding large quantities of water, frequently estimated at more than 500 gallons per minute (gpm).

Well yields in Blount County are somewhat lower than the discharges of springs. Most geologic formations yield less than 25 gpm, unless solution cavities are encountered. In those cases, yields then increase dramatically to more than 100 gpm. The largest-yielding wells belong to the city of Maryville. These wells in the Knox Group yield up to 500 gpm with a drawdown of 30 feet after pumping for 72 days. Wilson and Kernodle (1971) determined that there is a 96.6 percent chance of obtaining 3 gpm or more from a well in this area, which is adequate for most domestic uses, and a 25.6 percent chance of obtaining 25 gpm or more. Blount County ranks fourth in Tennessee for the chance of obtaining these larger supplies.

Groundwater accounts for approximately 4.5 percent of the water withdrawn for municipal, industrial and irrigational uses in Blount County. In all, about 89,000 gallons are withdrawn daily by 24 inventoried users, shown in Table III-6. There are no major groundwater users within the study area. Municipal groundwater supply is generally limited to operations such as small mobile home parks. The biggest municipal groundwater user in the study area is the Walland Water System which supplies approximately 27,000 gal./day. Table III-6 lists the five groundwater users with fifteen or more connections. A survey of industries

TABLE III-6

GROUNDWATER USE IN BLOUNT COUNTY IN THOUSAND GALLONS PER DAY[1]

Use	Wells	Springs	Total Water Use*	Percent of Total Water Use
Municipal[2]	32.0	0.0	11,170	2.9
Industrial[3]	31.9	1.9	6,173	5.5
Irrigation[4]	3.1	10.0	50.6	25.9
Total of Inventoried Users	67.0	11.9	17,393.6	4.5

[1] Does not include private domestic supplies and use

[2] For 7 users

[3] For 11 users

[4] For 6 users

*Includes both surface and groundwater

Source: Kernodle and Wilson. Water use in Tennessee, 1970. 1973.

with more than 25 employees indicated no major industrial groundwater users in the study area. All firms surveyed indicated surface water use via the Alcoa or Maryville water supply systems.

The quality of groundwater in Blount County is generally good. According to water quality data gathered around 1950, the primary problem was hardness. Hardness as $CaCO_3$ ranged from less than 50 to more than 350 mg/l in the Cambrian and Ordovician carbonate aquifers. Table III-7 shows water quality data from several wells in Blount County. Wilson and Kernodle (a971) determined that there is an 89.4 percent chance of obtaining good quality water, with no sulfur, iron, salt, oil or gas, in Blount County.

Conversations with staff members at the Blount County Health Department, the Tennessee Department of Public Health and the Department of Conservation yielded no more recent data. There are no federal, state or local groundwater quality monitoring programs in the Blount County area.

Discussion with local health department officials has indicated that some private drinking water wells have had problems with coliform bacteria. It has not been determined whether these problems result from wastewater disposal fields, either on the same property or any adjacent properties. In some cases, the problem is thought to be a result of agricultural activities.

In outlying portions of the County where wastewater absorption fields overlie the major aquifers (Knox dolomite, Lenoir and Holston limestones, and Athens shale), groundwater contamination could become a problem if adequate treatment of wastewater does not occur. Improperly installed soil absorption systems (i.e., trenches and seepage beds) could introduce pollutants to the groundwater which could reach private water wells. However, at this time, no cases of groundwater contamination due specifically to soil absorption systems have been documented.

Most of the County consists of soils rated as fair for the successful operation of conventional on-lot soil absorption systems. Some problems

TABLE III-7

MEAN VALUES OF CHEMICAL CONSTITUENTS IN GROUNDWATER
IN PARTS PER MILLION

Geologic Horizon	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium & Potassium (Na & K)	Bicar-bonate (HCO_3)	Car-bonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Hardness as $CaCO_3$	Specific Conductance (mmhos)	pH
Holston Formation	0.24	42	8.6	2.0	0	158	5	5.1	--	--	139	168	7.8
Lenoir Limestone	0.10	34	11.6	17.0	0	187	11	3.8	--	--	133	324	7.7
Athens Shale	0.36	71	23.6	28.3	7	240	115	5.6	--	--	274	583	7.9
Knox Group	0.10	39	19	16.3	2.5	200	34	4.3	--	--	175	378	8.0
Nolichucky Shale*	0.4	46	2.0	2.9	0	147	4	3.2	0.1	--	123	254	7.6
Shady Dolomite	0.4	19	13	5.5	0	132	1	2.5	--	1.1	101	207	8.2

*Data available for only one well

SOURCE: DeBuchananne and Richardson. Groundwater Resources of East Tennessee. 1956.

with these systems may occur particularly where they are located too close to a restrictive horizon. A restrictive horizon could be a characteristic such as a seasonally high water table less than two to four feet from the bottom of the absorption area or shallow or fractured bedrock. Fractured bedrock that reaches to open solution cavities can readily transmit contaminated water to discharge points such as wells or surface streams.

These soils, however, are adequate (rated fair to good) for allowing the continued successful operation of modified or alternative systems such as sand mounds or oversize absorption fields. If such systems are installed for new homes or as replacement systems, groundwater quality problems would be less likely to occur as a result of soil restrictions such as the typically shallow depth to bedrock.

The land disposal sites selected for the 35 small community systems were located on soils that would allow adequate renovation of wastewater so that groundwater quality problems would not result. It is very important that detailed investigations of these sites occur before they are constructed, and that they are properly maintained because many of the sites are located near small streams or sinkholes. If malfunctions were to occur, groundwater or surface water contamination could result as effluent was transported away from the site through sinkholes or streams.

In slow rate spray irrigation systems, groundwater contamination would be less likely to occur than with rapid infiltration-type systems. This is because much of the water in spray irrigation would be lost by evapotranspiration from the vegetative cover and nutrients would be taken up by the plants. Rapid infiltration, by nature of the application rates, would be more likely to result in groundwater problems. Application rates would exceed evapotranspiration rates, and more effluent would reach the water table. If this effluent should encounter fractured bedrock and enter solution channels, pollutants could be transported some distance if the system is not operated properly.

Little increase in groundwater supplies would be noted with slow rate spray irrigation disposal. As mentioned above, little water would reach the water table, particularly during the warmer months when evaporation and transpiration rates are high. This would not provide a great benefit to the regional groundwater quantities because the application sites are small and far apart.

Rapid rate land application systems, on the other hand, would allow greater groundwater recharge. However, due to soil limitations these systems are operable only at the disposal sites for Rocky Branch, Walland and Top of the World Estates. If all the wastewater from these three communities were allowed to reach the water table it would only result in a total rate of recharge of approximately 70,000 gallons per day on the average and very localized.

4. Biological Resources

Blount County contains a variety of natural communities. These communities are best characterized by their predominant vegetation. Vegetation patterns are important because they are highly visible, relatively stable and they largely determine the extent of other ecological components such as wildlife.

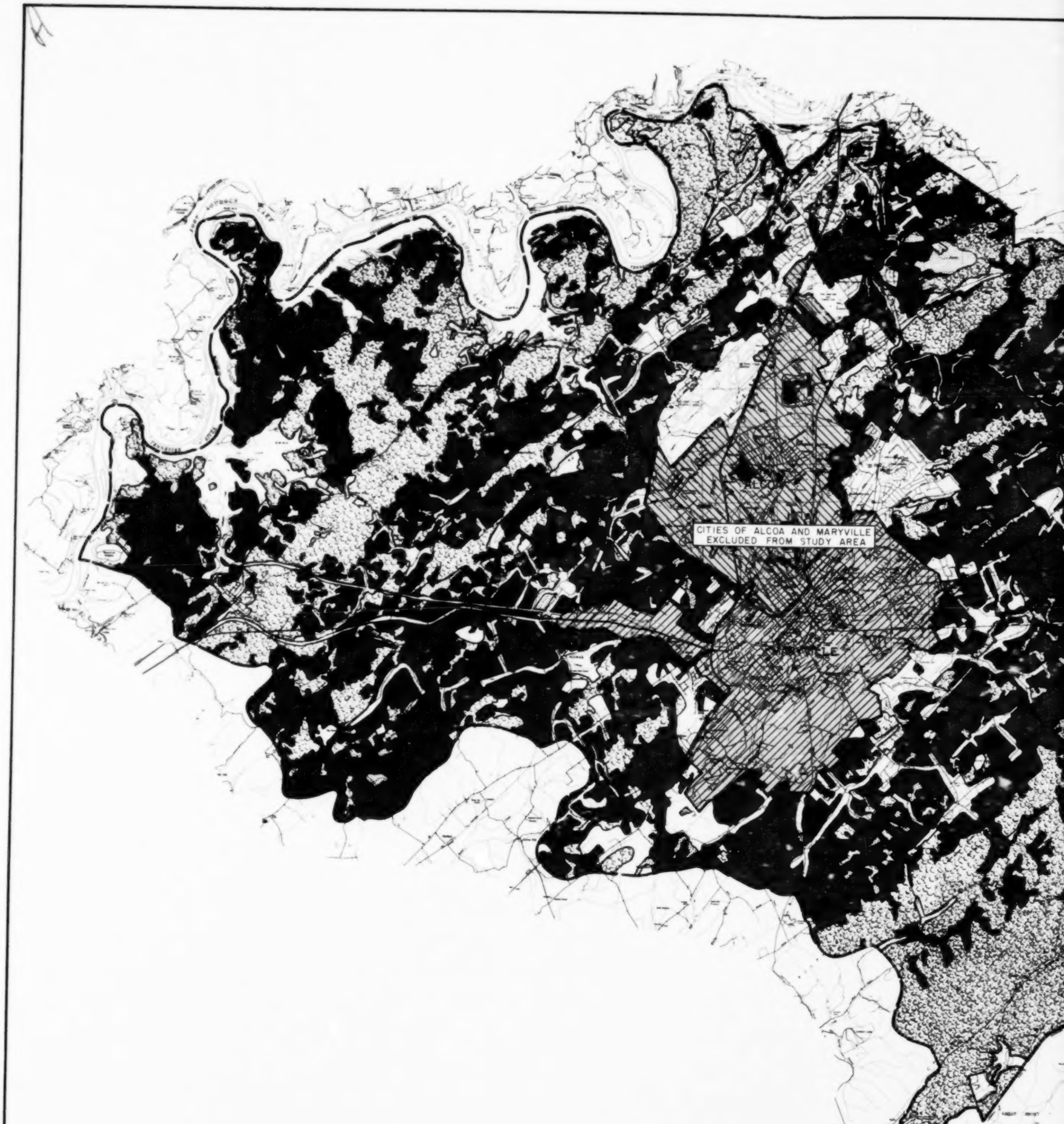
Prior to European settlement, the Blount County area was almost entirely vegetated by deciduous forests. The original forests of this region have been described as Oak-Chestnut by Braun (1950) and Appalachian Oak by Kuchler (1966). The American chestnut (Castanea dentata) was the most important single tree species in these forests, but a variety of oaks (Quercus alba, Q. prinus, Q. velutina, Q. maxima) shared dominance. Within this region, at particularly favorable sites in lowlands and coves, forests similar to the Mixed Mesophytic region to the north and west were well developed (Braun 1950). These lowland cove forests were characterized by a large diversity of trees with dominance well distributed among the species. Important trees of these cove forests included tulip poplar Liriodendron tulipifera), basswood (Tilia heterophylla), yellow buckeye Aesculus sylvatica), sugar maple (Acer saccharum) and American beeck (Fagus grandifolia).

The natural vegetation patterns of Blount County have been largely altered from their original condition. The clearing of forests for agriculture, logging and other human activities have undoubtedly changed vegetation to a large extent. Agricultural fields and pastures now cover much of the study area and most of the remaining forests have been repeatedly logged (Thomas 1966). Successionally advanced or mature forests are relatively uncommon, and virgin forests only remain in small, isolated areas or refuges such as the Smoky Mountains.

Another factor which has greatly influenced the existing natural communities has been the almost total destruction of the American chestnut due to disease. The unintentional introduction of the chestnut blight fungus to North America has all but extirpated the former dominant tree species of this region. Although other trees such as oaks and tulip poplar have revegetated those areas once covered by chestnuts, the various wildlife species that depended on chestnut mast for food were seriously affected (Linzey and Linzey 1971).

The location and extent of existing vegetation in Blount County is largely determined by the physiography of the landscape with its resultant influences on land use. The predominantly lowland Ridge and Valley section covering the north, central and western parts of the study area has been largely cleared of forests due to the abundance of level lands suitable for agriculture. In contrast, the rugged topography of Chilhowee Mountain and the Smoky Mountains in the southeastern part of the study area has resulted in the perpetuation of forests. Figure 3-3 shows distribution of general vegetation patterns within the study area.

Seven vegetation communities are recognized in the study area, based on a review of vegetation studies in the Smoky Mountains (Whittaker 1956; Stupka 1960), Chilhowee Mountain (Thomas 1966) and the Ridge and Valley province (Martin 1971). These communities include five forest types (oak, cove hardwoods, hemlock/white pine, riparian and pine) and two herb or shrub dominated communities (fields and freshwater marshes).


CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
ALCOA
MARYVILLE
LEGEND
DECIDUOUS
EVERGREEN
MIXED
AGRICULTURE

B

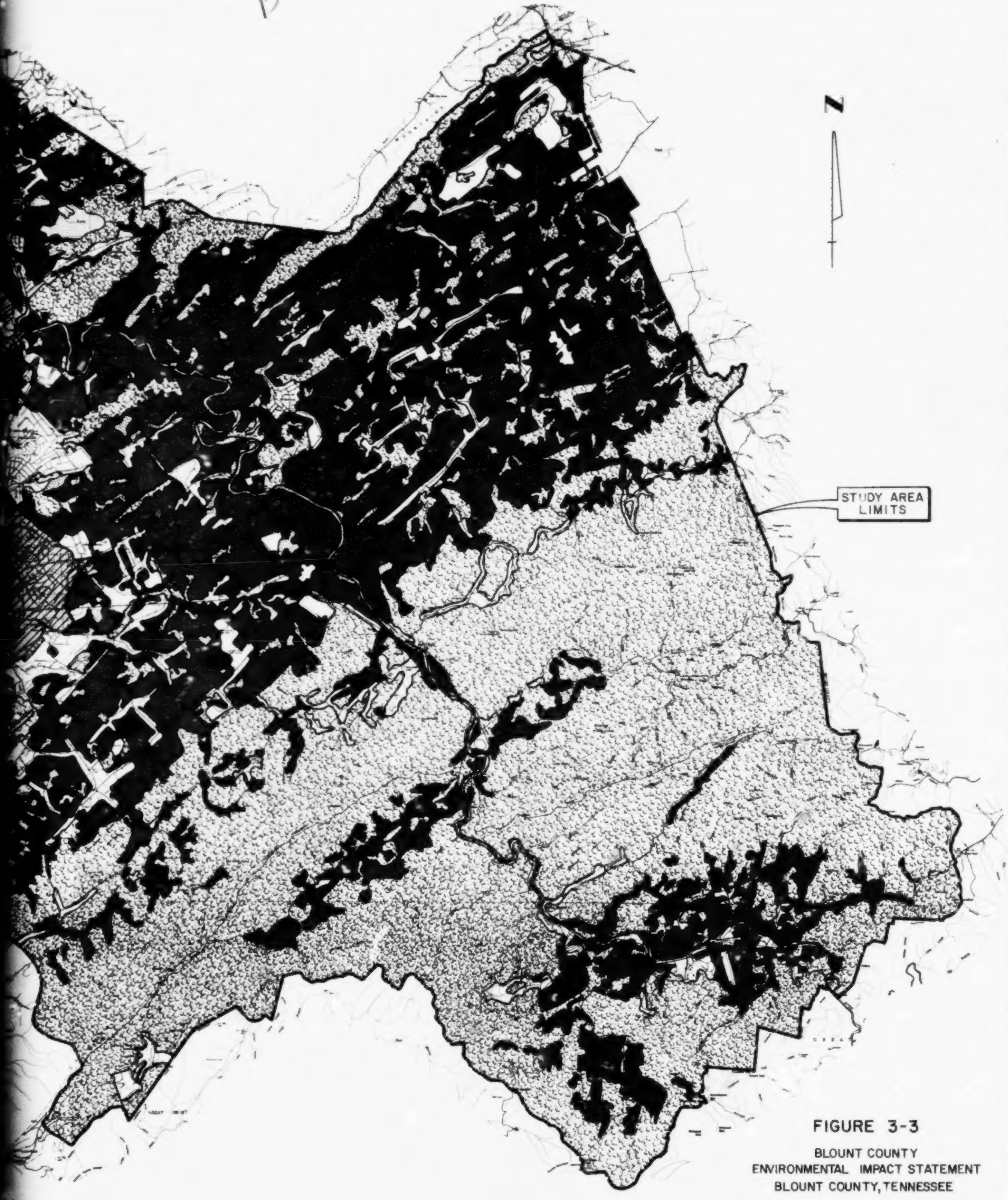

N
STUDY AREA LIMITS

FIGURE 3-3

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

VEGETATION MAP

7000 0 7000 14000
SCALE IN FEET

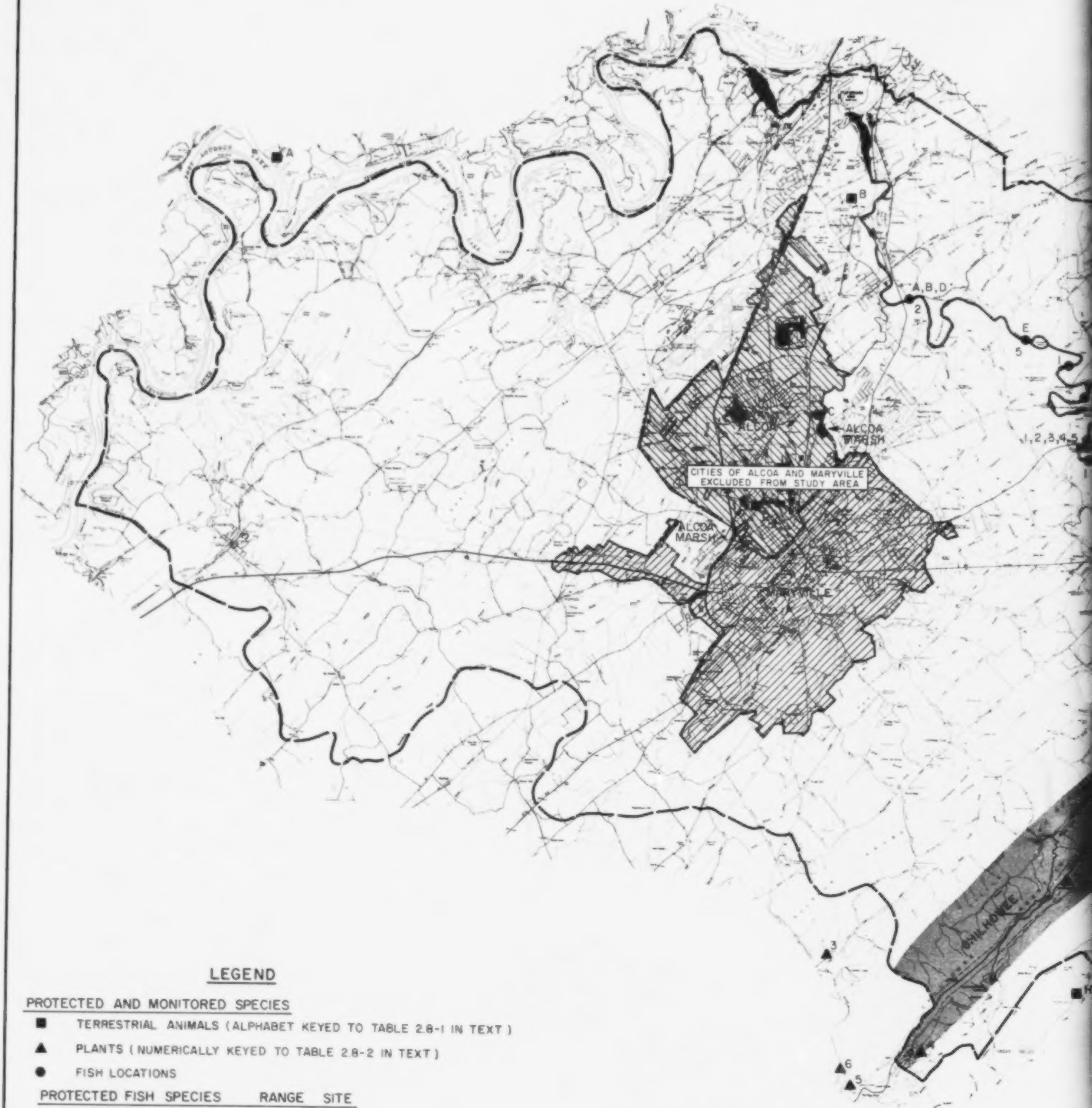
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IX ATLANTA, GEORGIA

The Blount County region contains 68 species of plants which are listed as endangered, threatened, special concern or possibly extirpated. These species are monitored by the Tennessee Heritage Program, (THP) but are not afforded any legal protection under existing state or federal laws. Appendix B lists the monitored plants known from the Blount County region, including information on their status and occurrence; this list was compiled based on data from Blount and Sevier counties, due to the similarity of habitats in these two adjacent counties. Figure 3-4 shows the known locations of documented sitings for monitored plants in the Blount County study area.

An examination of the distributions of monitored plants in the study area, as shown in Appendix B and Figure 3-4 reveals several trends. The occurrences of monitored plants appear to be largely or entirely restricted to the mountain region in the southeastern part of the study area. Within the mountain region, monitored species tend to cluster in definite patterns. For instance, eight known locations of monitored plants are found on Chilhowee Mountain; an additional eight locations are clustered within a small area near tributaries of the Little River within the Great Smoky Mountains National Park; another, less pronounced, aggregation occurs at Rich Mountain Gap near the Great Smoky Mountains National Park boundary. Rare plant species often tend to cluster in certain locations (Ayensu & DeFilipps 1978), and this tendency should be taken into account when potential development alternatives are considered. Clustering may be due to several factors: similarity of habitat requirements (Ayensu & DeFilipps 1978), protection afforded by biotic refuges such as the Great Smoky Mountains National Park and scientific investigation patterns which are often localized due to the accessibility of various sites.

As with the natural vegetation, the original abundance and diversity of animals in the study area has been greatly altered. In general, wildlife has been reduced because of habitat destruction, pressures from hunting and trapping and other environmental perturbations. Some species, such as the black bear and beaver, were greatly reduced in numbers and are now found only in very remote areas; other species, such as the cougar and

A


A
B
A,B,D
2
E
5
C
ALCOA
ALCOA MARSH
1,2,3,4,5
CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
ALCOA MARSH
MARYVILLE
3
6
5
4
H
CHILHOWEE

LEGEND

PROTECTED AND MONITORED SPECIES

- ■ TERRESTRIAL ANIMALS (ALPHABET KEYED TO TABLE 2.8-1 IN TEXT)
- ▲ PLANTS (NUMERICALLY KEYED TO TABLE 2.8-2 IN TEXT)
- ● FISH LOCATIONS

PROTECTED FISH SPECIES	RANGE	SITE
ETHEOSTOMA CINERUM	A - A'	1
E. CATONOTUS	B - B'	2
PERCINA BURTONI	C - C'	3
P. AURANTIACA	D - D'	4
P. MACROCEPHALA	E - E'	5

▨ ENVIRONMENTALLY SENSITIVE AREAS

1 B

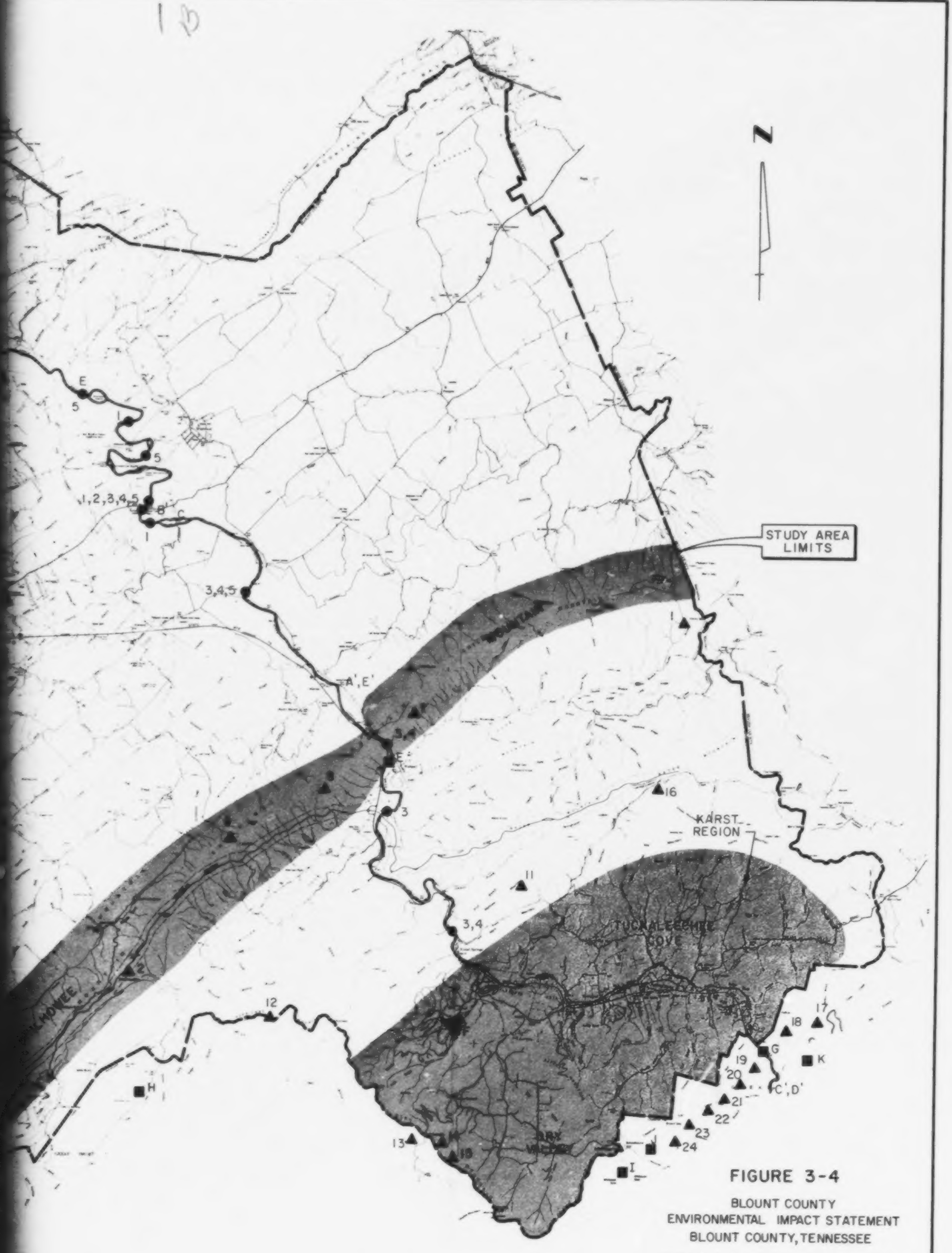

N
STUDY AREA LIMITS
E
5
1
5
1,2,3,4,5
B'
C
1
3,4,5
A',E'
MOUNTAIN
3,4
E
3
CHILHOWEE
2
1
16
KARST REGION
11
3,4
TUCKALEECHEE COVE
12
H
17
18
G
K
19
20
C',D'
21
22
23
24
J
I
13
15
DRY VALLEY
AS

FIGURE 3-4

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

SENSITIVE AREAS AND ENDANGERED SPECIES

7000 0 7000 14000
SCALE IN FEET

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV ATLANTA, GEORGIA

river otter, are probably extirpated or at the least extremely rare; a few species, such as the bison and elk, were eliminated completely by early settlers (Linzey & Linzey 1971).

Nevertheless, the wildlife resources of Blount County are still quite abundant and varied. Many animals have adapted well to man's presence and some species have actually benefitted. For instance, deer were apparently quite rare when the area was still densely forested, but are now relatively abundant due to the intermixing of forests and fields (Linzey & Linzey 1971). The present richness of wildlife in Blount County is also greatly enhanced by the proximity of the area to the Great Smoky Mountains National Park. The Smokies have undoubtedly served as a refuge for many species of animals which otherwise may have been extirpated or eliminated. In the undeveloped mountainous regions of the study area, the fauna is certain to closely resemble the rich variety and abundance found in the Smokies.

The Blount County region contains a number of terrestrial animal species which are protected or monitored by government agencies. A list of these animals, including information on habitats, status and occurrences is also presented in Appendix B. This list includes two amphibians, five reptiles, 20 birds and 18 mammals. Appendix B was compiled based on information from Blount and Sevier Counties due to the closeness and similarity of habitats in these two counties. Figure 3-4 shows the known locations of documented sitings for protected or monitored terrestrial animals in the Blount County study area.

Legal protection applies only to those animal species listed as endangered or threatened in the federal or Tennessee State listings. Legally protected species include the northern pine snake, golden eagle, common raven, red-cockaded woodpecker, eastern cougar, river otter and Indiana bat. Those species listed as "deemed in need of management," or listed exclusively by the THP are not legally protected but are considered rare enough that they are monitored by the THP.

The kind and type of aquatic communities that can be expected in the Blount County EIS study area are dependent mostly on the quality of the water and abundance of selected habitat. In general, the Little River drainage shows a wide range in environmental conditions. The quality of the aquatic communities in this system is indicated by the variety of clean water species. This system supports a large number of fish and aquatic insect groups.

Most of the tributaries of the Little River have their stream beds composed of alternating sandy-pools and rock/gravel-riffles. There are some differences in the physical structure of the drainage system and these are pointed out in the following sections. The water quality, point and nonpoint pollution sources and land use patterns for the study area are summarized in other sections of this report. The influence of these factors can be expected to control the composition and structure of the aquatic community.

The Blount County study area includes approximately 35 miles of the Little River. This river rises in the Great Smoky Mountains National Park and empties into the Little Tennessee River in the northern part of the County. The course of the river is composed of approximately 40% pools and 60% riffles. In general, bank vegetation cover is shading the river for 80% of its course. Also included in the study area are the various tributaries of the Little River and include such creeks as: Crooked Creek, Carr Creek, Hess Creek, Reed Creek, Brickey Creek, Ellejoy Creek, Little Ellejoy Creek, Nails Creek and Pistol Creek. The bottom substrates are composed of alternating stretches of riffles and pools with corresponding substrate type (e.g. gravel, rocks and boulders for riffle areas and sand and depositional materials in pool areas). Many of the cold water tributaries exist in areas where no development has occurred and the water quality and resulting communities are extremely healthy. In addition, the Little River supports several fish species that are being considered for proposal as endangered or threatened. In most of these areas, records show the healthiest and most abundant records for these populations..

The Little River has a particularly rich fish fauna. This can be attributed to the abundance of microhabitat and food sources. For example, in one area within a river distance of 1/2 mile, approximately 15 species of the darter family (percidae) have been found to occur (Dickinson pers. comm.). This fish family is noted for its species-specific microhabitat selection. That is, certain species prefer quiet backwaters while others prefer swift currents while still others have different rock size preferences or live in submerged aquatic vegetation beds. The Little River possesses all of these aquatic microhabitats.

The upper parts of this river also support a sizeable trout fishery. From personal contacts with University of Tennessee biologists, it is thought that trout do reproduce in the Park area extending into the Townsend area and tributaries. However, the Tennessee Fish and Game Department does stock trout in the river.

Five aquatic species of concern have been cited by USFWS as possibly being in the study area. The Fine-rayed pigtoe pearly mussel (Fusconia cuneoulus) is currently listed as endangered and has recently been found near the Maryville treatment plant. The spotfin chub (Hybopsis manocha), listed as threatened, is only known from Abrams Creek in the south portion of the County which is outside the study area. The spiny river snail (Io fluvialis), the mainstream river snail (Leptoxis praerosa) and the Verrucose river snail (Io verrucosa verrucosa) were formerly proposed for endangered status but are not currently under formal consideration.

In addition, five darter species are being considered for proposal: Ashy darter (Ertheostoma cinereum), Duskytail darter (E. catonotus), Blotchside darter (Percina burtoni), Tangerine darter (P. aurantiaca), Longhead darter (P. macrocephala). All five of these species are known to inhabit the Little River. The distribution of these darters are shown on Figure 3-4 and specific habitat data is presented in Table B-3. Many of the records show that these populations are the healthiest and largest for each species for the state of Tennessee and the U. S. The distribution of some of these species covers the entire course of the Little River (e.g. Tangerine and Blotchside darters, Figure 3-4).

Little published records of the two remaining fish species (Mountain Redbelly Dace, Phoxinus oreas and flame Chub, Hemitremia flammea) exists in the literature. The information presented in Appendix B for these species was provided by personal communication with biologists at the University of Tennessee.

It should be pointed out that while the range of these species in the river may be large, the actual site where each species may be found is limited by the presence of the species-specific microhabitat. All of these species use the clean, silt-free, riffle areas as breeding grounds; there is evidence of higher silt loads in the lower stretches of the river which may cause the loss of this habitat (Starnes, personal comm.). In addition, all of these species would be sensitive to pollution from either point or nonpoint sources.

Aquatic species would be directly impacted by surface discharges from package plants in the Little River basin under alternative 3. The five darter species discussed above would all be subject to impact. The specific impacts from package plants would depend upon waste load allocations, permit requirements, nonpoint source loadings in the drainage basin and current water quality in the receiving stream. Although specific impacts cannot be itemized, general impacts can be discussed. Nutrient and other pollutant loadings would generally increase with the addition of package plant effluent. In areas with little riparian vegetation or in areas where such vegetation is removed by new construction, algal growth is likely to be stimulated by the increased nutrient levels. Phosphate and nitrogen removal would not be required at these plants and the potential increase in algal biomass and productivity would lower dissolved oxygen levels and impact aquatic communities. In addition, the chlorination of the package plant effluent could have serious impacts on the stream biota if dechlorination of the effluent is not required.

Little information is available on the pollution tolerance of the Fine-rayed pigtoe pearly mussel (Fusconia cuneoulus) which has recently been found in the study area. The species was found in the lower gradient and higher temperature stretch of the Little River. This area does receive substantial sediment input from the existing, adjacent land uses. While impacts cannot be delineated with accuracy, potential impacts exist for the interceptor and surface discharge alternatives.

The package plant proposed for Townsend under alternatives 1, 2 and 4 would use land application for disposal of effluent thereby avoiding these potential problems. However, if the plant ever malfunctiond in a way that caused effluent to reach the Little River, significant impacts to aquatic species could result.

Adverse impacts to aquatic systems associated with increased runoff resulting from land use changes would be realized in all service areas but would be most extensive in the Townsend/Kinzel Springs area. The changes in land use would lead to increased construction and increased areas of impervious surfaces. These changes would produce increased sedimentation, increased maximum temperatures in the river and major shifts in the aquatic biota. These conditions would be further exacerbated if significant amounts of riparian vegetation were removed.

Land use changes throughout the study area are primarily changes from agricultural to residential. This change typically is associated with a decrease in average nitrogen and suspended solid loadings and an increase in average phosphate and BOD loadings.

Because all the alternatives will provide service for growth and development, the impacts described above will be present with each of them. However, the degree and severity of potential impacts would be greatest under the full 201 alternative because greater capacity is present in the interceptors which will enable them to support greater development over a wider geographic area. As a result, nonpoint source pollution associated with this development would be greater. As a result, changes in sedimentation and temperature, especially of the Little River could be extensive with resulting major shifts in aquatic biota.

The predominant use of septic systems under the on-lot alternative would require larger lot sizes and larger cleared areas on the average in order to accommodate drainage fields. This will lead to more acres being converted to residential land use. Potential impacts would be greatest in the eastern County and Townsend/Kinzel Springs areas where the dominant land use is mixed forest and has a higher habitat value to wildlife. Land use conversion throughout the study area is anticipated to be mainly agricultural to residential. However, the use of more innovative techniques for on-lot systems under this alternative could lead to the increased use of forest areas with greater slopes. This alternative, however, will not induce growth and development as most of the others would. Therefore, land conversions for growth could actually be less under the on-lot alternative.

Impacts to terrestrial systems under the small community systems alternative will be associated with the facility siting, pipeline corridors and future residential development. The number of acres utilized for treatment plant siting will be small. However, the use of land disposal at these sites will require the dedication of a significant number of acres. Site visits to these potential sites indicates that virtually all the land is currently in agricultural use and would involve minimal conversion of forested areas. The pipeline right-of-ways would probably be along existing roadways in existing residential areas and would have minimal impact on terrestrial systems. Impacts to riparian vegetation from either collection lines or effluent discharge points should be minimized to the extent possible by mitigative measures.

Most land use conversions associated with future development are expected to be from agricultural to residential land use and will have minimal impacts on natural terrestrial systems. Residential densities under this alternative could be greater than where on-lot systems are used resulting in the conversion of fewer acres of undeveloped land.

The size of the service area for the suburban Maryville/Alcoa limited interceptor alternative is relatively small and is composed largely of agricultural and residential areas. Approximately 700 acres of forest land is included in the service area, but development will probably occur on the flatter, cleared agricultural land. Interceptor routes will not be through forested areas. Impacts to the terrestrial systems are expected to be minor under this alternative.

Impacts from the 201 alternatives to the terrestrial systems will vary across the study area. Land conversion impacts from pipeline right-of-ways and residential development will be more important for area wildlife where forested lands are converted and less important for agricultural lands. Although the service areas in the northwestern County and Maryville/ Alcoa periphery areas both include approximately 3000 acres of forest land, impacts to terrestrial systems are expected to be greater in the northwestern area. Agricultural land use is dominant (51%) in the Maryville/ Alcoa periphery area and the bulk of the land conversions are expected to be from agricultural to residential. However, forest land is dominant in the eastern County service area (41%) and will be converted to a larger extent. Although forested land accounts for the vast majority of the eastern County and Townsend/Kinzel Springs areas, the service areas for the limited 201 alternative also incorporate substantial amounts of existing residential and agricultural land. Approximately 500 and 800 acres of forest lands are included in the eastern County and Townsend/Kinzel Springs service areas. Development within these service areas is expected to be primarily in agricultural and residential areas. The service area in the Nails Creek area will serve existing residential and agricultural areas with only small areas of forest lands.

The right-of-ways for the gravity interceptors along Laurel Branch and Flag Branch and in the Dellwood area as well as the force main along the Little River could have major impacts on the riparian vegetation in these areas. The disruption of this habitat would impact terrestrial wildlife populations as well as aquatic systems.

5. Community Services and Facilities

Growth and development served by sewer service expansion has the potential to cause a need for increased public facilities, such as fire and police protection; transportation facilities; health, education, library and administration facilities and utilities. The maintenance of existing service levels in these areas could require additional taxes to pay for needed improvements. Currently, Blount County public facilities and services are for the most part adequately meeting public needs.

The implementation of the small community systems alternative or the suburban Maryville/Alcoa alternative would support the implementation of the Blount County Land Use Plan and lead to the provision of additional public services and facilities in an orderly and cost-effective manner. The limited 201 alternative is also designed to implement the land use plan. However, the capacity available in the interceptor lines could support excessive growth in certain areas which could lead to increased costs for the provision of services and facilities in these areas.

The potential problems with the limited 201 alternative are magnified with implementation of the full 201 alternative. There is significant potential for growth beyond what has been projected resulting in an expanded need for municipal services. Many of the locations where excessive growth will be encouraged are at the most distant edges of the County where city services are minimal and County services are strained to reach. Friendsville, Seymour/Shooks Gap and particularly Townsend are the primary examples.

The on-lot alternative will generally follow the land use plan and the orderly provision of services and facilities. However, areas surrounding Maryville and Alcoa may develop at slightly lower densities than would otherwise be the case. This could lead to some small increases in cost for the provisions of some services and facilities.

It is projected that under the no federal action alternative growth and development will proceed as projected in the land use plan which will lead to the orderly provision of community services and facilities. However, this alternative would require significant expenditures by local government to extend sewer service to areas in the periphery of Alcoa and Maryville. This could possibly divert funds from the support of other public services.

6. Economics and Employment

Large employers in Blount County include the Aluminum Company of America (ALCOA), Schlegel-Tennessee, Inc. (rubber), Levi Strauss & Company (clothes) and Rockford Manufacturing Company (cordage and yarn). ALCOA, the largest employer, has three plants all located within a 10 mile radius within the Alcoa city limits. These three plants currently employ approximately 4500 individuals. The early 1970's saw the largest employee level at the three plants (5000 to 6000 persons) since World War II. However, 1974-1975 business trends reduced employee levels to approximately 4500 persons. Despite some recent minor employee level fluctuations, this figure is not expected to vary greatly in the near future. There are three industrial parks in Blount County. Only the Littlebrook Industrial Park is located in the study area, just northeast of the Alcoa city limits. The other two, the Blount County Industrial Park and the Metro-Air Commercial and Industrial Park, are located within the Maryville and Alcoa city limits, respectively.

Recreational activity in Blount County generates a significant economic impact on the study area. Since 1971, the Great Smoky Mountains National Park has attracted between 7 and 9 million visitors per year. In 1975, the National Park Service recorded over 8 million visitors, 14 percent of whom used the Townsend park entrance in the study area. The Townsend/Tuckaleechee Cove area depends heavily upon tourism for its support (National Park Service 1979). Tourist expenditures contribute to making the recreation industry an important facet of the County economic base.

In 1975, tourist expenditures totaled approximately $159,000,000 by an estimated 1,454,000 people staying an average of 5.5 days in the Smoky Mountains National Park region (National Park Service 1979). Blount County had the second highest level of tourist expenditures of the Tennessee counties in 1975. Studies conducted by the National Park Service in 1974 and 1975 and summarized in the Recreation and Open Space section, reflect the importance of park visitor expenditures to the economy of the surrounding park region including the study area.

One characteristic of park visitors which may have some influence on individual expenditures in the park region is socio-economic status. In comparison to the national average, the socio-economic status of park visitors is fairly high. In a park visitor survey conducted in 1974 and 1975, it was discovered that approximately 50 percent of the households surveyed utilizing park facilities had annual incomes of at least $15,000. Twenty-nine percent reported incomes of $20,000 or more per year. Only 21 percent of park visitors earned below $10,000 per year. These figures are on a regional basis, but figures for each individual park entrance may be proportionate to these.

The location of industrial and commercial facilities is often influenced by the availability and extent of public services. The availability of public wastewater facilities around McGhee-Tyson Airport proposed in the interceptor sewer alternatives would make the area more attractive for future commercial and industrial development, possibly resulting in more numerous and diverse employment opportunities. Construction of the interceptors and pump stations will also directly result in an increase in construction employment.

The availability of sewer service to the Townsend area could also have significant influence on economic activity within that area. All of the alternatives provide service for the projected year 2000 population level. The full 201 alternative, however, provides service for a much larger population. The implementation of this alternative would eliminate the provision of wastewater service as a constraint to large tourist, recreation oriented development for this area. Thus, the provision of such service now could act as a stimulus to future economic activity. This stimulus would in effect be the provision of a subsidy to future economic developers by current federal and local taxpayers.

7. Environmentally Significant Agricultural Lands

An examination of past trends in farming activity shows that agriculture has been a small and declining sector of the local economy. The number of farms is decreasing and, recently, even the average farm size has fallen. Total farm acreage decreased by about 20% from 1969 to 1974, however, from 1974 to 1978, the decrease slowed to 9%, (Department of Commerce, 1977). During this later period the total value of farm products sold did grow by about 52%, yet total personal income in the County grew by almost 57%, (Staley, 1980). Therefore, in relative terms income from agricultural production decreased slightly.

Based on a review of preliminary 1978 data the primary agricultural activity in the County is production of livestock, poultry and their products, which amounted to about 64% of the total value of agricultural products sold in 1978. Raising of cattle and calves and dairy farming have been by far the major livestock activities. Based on 1974 statistics for the most productive farms (those with sales of $2,500 and over), dairy products account for a slightly greater share of total sales, (U.S. Department of Commerce, 1977). Concern has recently been raised in the Knoxville area over the impacts which conversion of prime farmland may have on the local dairy industry. Dairy farming is an important economic activity in the counties surrounding Knoxville (including Blount); however, in recent years there has been a steady decline in the number of dairy farms due in part to the conversion of farmland to urban use, (University of Tennessee, 1977).

Following livestock, crops are the second most valuable farm commodity amounting to just over 36% of farm product value. These figures reflect an increase in the share of total value contributed by crops and a decrease for livestock since the 1974 census of agriculture. Again, referring to 1974 data for only the most productive farms, the leading crops are grains and tobacco.

It is also important to consider the uses which are being made of agricultural land. About one third is used for pasture or grazing with another 30% being used as harvested cropland. Between 1974 and 1978 there was a 6% decrease in the percentage of total farmland devoted to pasture and grazing land while harvested cropland increased by about 6%. The most significant change in land use was woodland which dropped from 21% of total farmland to only 8% in four years, (U.S. Department of Commerce, 1977).

Little information is available on the level of future agricultural activity in the area. If past trends continue, acreage devoted to farming, persons engaged in farming and the contribution of farming to overall income are all likely to decrease. Over the past ten years, however, the rate of decrease has been slowing and at one point there was even a slight increase in farm employment, (U. S. Department of Commerce, 1980). This suggests that it is difficult to draw any firm conclusion regarding the level of future agricultural activity in the area.

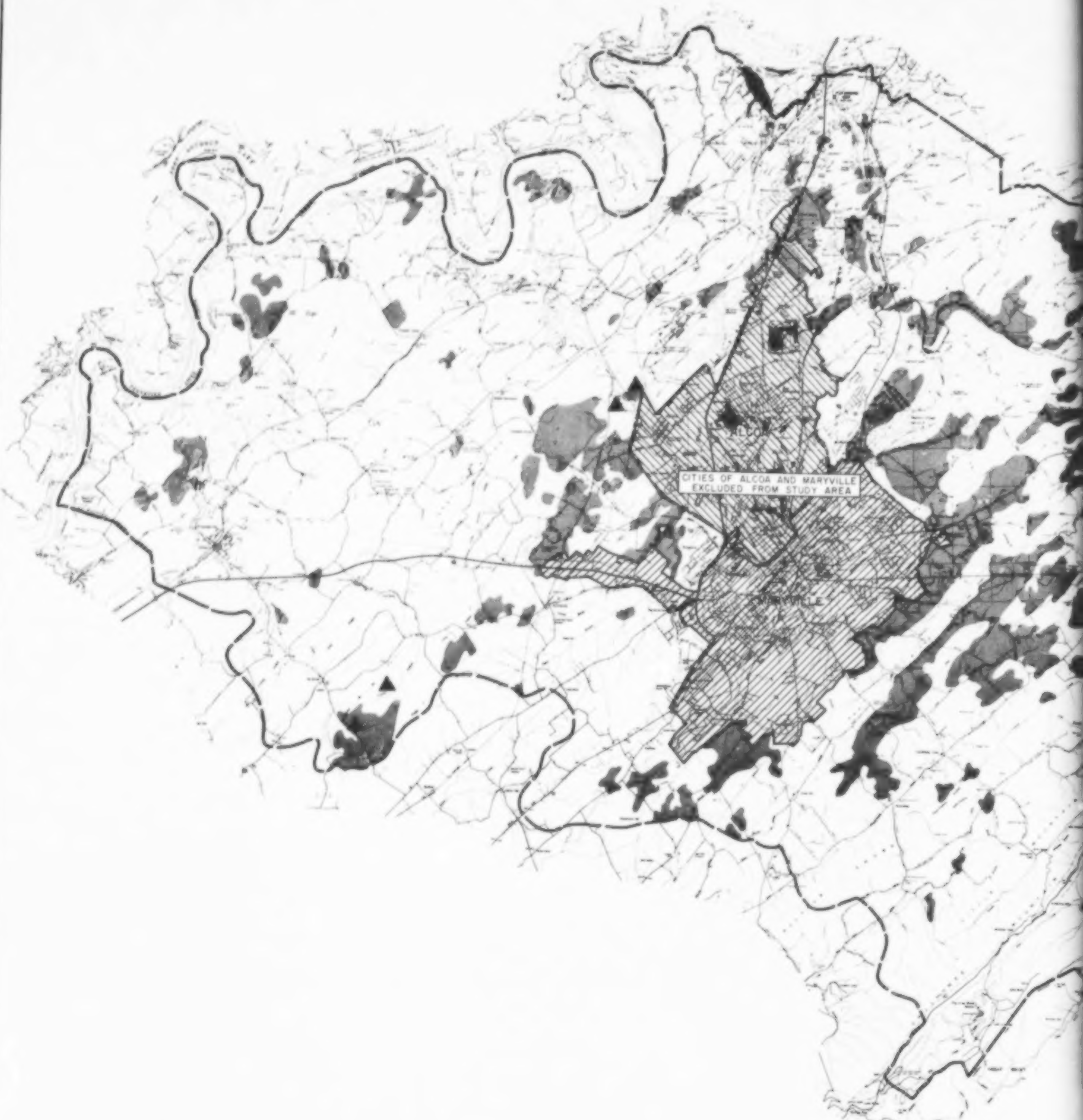
Within the Blount County study area there are extensive areas of environmentally significant agricultural lands. These lands are pictured on Figure 3-5. The criteria used in selecting these lands is largely based upon soils categories developed by the U. S. Soil Conservation Service. A more detailed description of the criteria is given in Appendix C.

Continued growth and development in Blount County will lead to the continued conversion of agricultural lands for residential and commercial land use. The no federal action, the on-lot and the suburban Maryville/ Alcoa alternatives will not provide federal funds to encourage this development.

There will be a direct impact on prime farmland from those small community systems where land application is selected for disposal and the application areas are prime farmland. This would include areas 4, 13, 14, 17, 18, 22, 24, 26, 27, 32 and 35. If rapid rate systems are used in these areas farming would probably be eliminated, however, if spray irrigation is selected many types of farming could still be undertaken. In any case the total areas involved is slight. Only in Townsend would more than 10 acres of prime farmland be required.

In some of the small community areas it is also possible that future residential growth served by the system would result in the conversion of prime land. Areas 5, 6, 7, 10, 11, 12, 13, 14, 15, 17, 18, 19, 21, 22, 23, 24, 27 and 29, half of all the systems, would provide service to prime farmland. Typically, however, the projected population increases are quite low. At prevailing residential densities the typical amount of prime land

R


CITIES OF ALCOA AND MARYVILLE EXCLUDED FROM STUDY AREA
ALCOA
MARYVILLE

LEGEND

▬ PRIME AGRICULTURAL SOILS

▲ FARMS WHERE BEST MANAGEMENT PRACTICES HAVE BEEN IMPLEMENTED

B

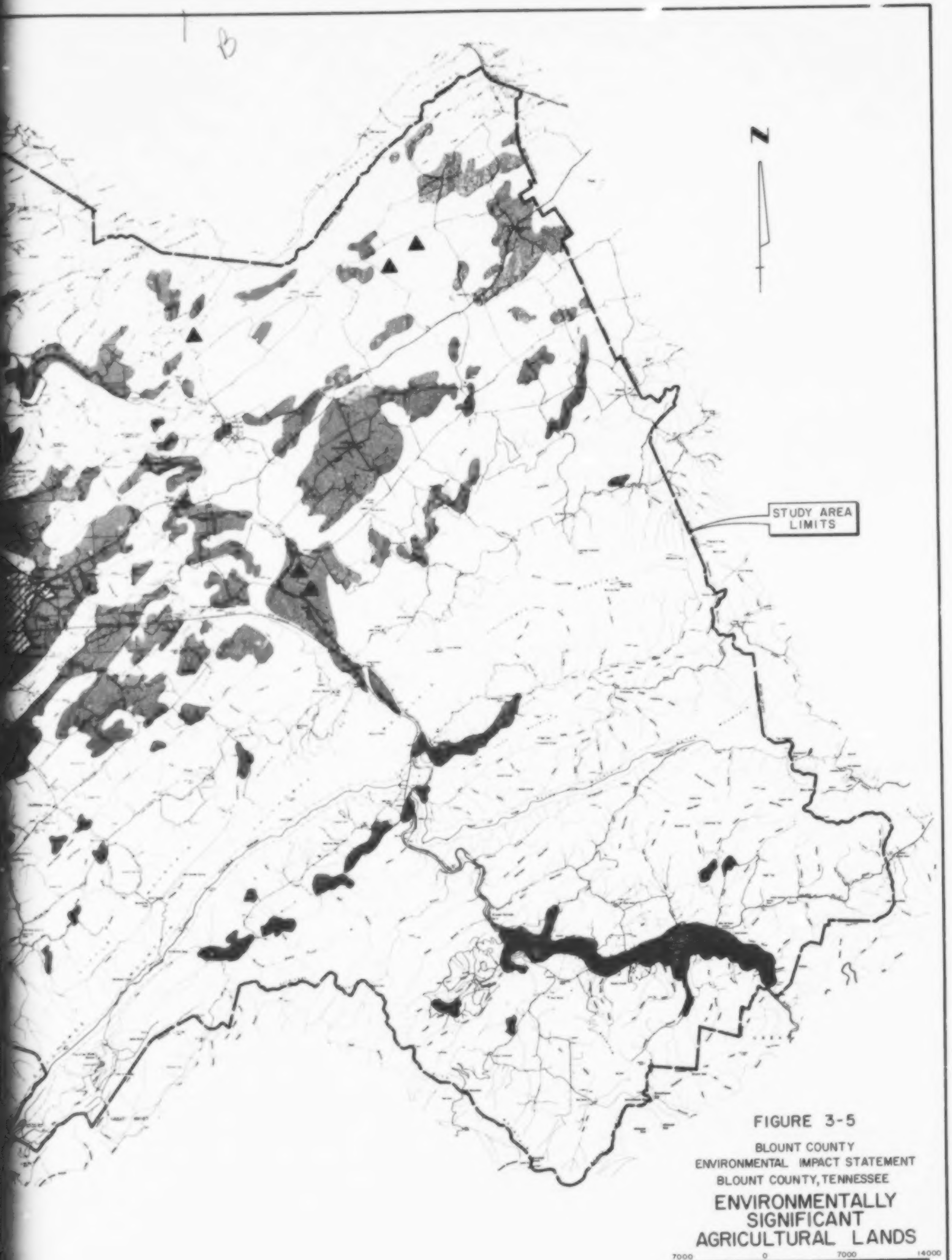

N
STUDY AREA LIMITS
7000
0
7000
14000
SCALE IN FEET

FIGURE 3-5

BLOUNT COUNTY
ENVIRONMENTAL IMPACT STATEMENT
BLOUNT COUNTY, TENNESSEE

ENVIRONMENTALLY SIGNIFICANT AGRICULTURAL LANDS

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

converted by each system would be about 50 acres. In Townsend about 80 acres could be converted and in Carleton and the Smoky View Estates areas 60 and 84 acres respectively could be converted. This impact could be mitigated by limiting future hook-ups on prime land. In many cases premature subdivision and subdivision of frontage lots by farmers have already adversely affected the viability of farming in these areas. Also, against this potential conversion impact, it should be recognized that the small community systems could serve to concentrate growth in specific nodes, lessening residential sprawl on large areas of prime farmland.

The limited 201 alternative provides wastewater service to areas in both the Alcoa/Maryville periphery and the Townsend area which include substantial amounts of prime agricultural lands. The potential is clearly present for inducing development in these areas thus converting prime land to non-agricultural uses.

The areas proposed for service in the full 201 alternative include a large percentage of all the prime farmland remaining in Blount County. Most of the prime agricultural land in the Alcoa/Maryville periphery and the Townsend/Kinzel Springs subarea is proposed for service. The only substantial acreage of prime land that would not be served is in the eastern County area beyond Wildwood.

Some of these locations proposed for service are already developed residential areas where much of the agricultural viability is lost. Other locations may include failing on-lot systems and therefore be eligible for service, however, there remain large areas of viable prime agricultural land proposed for service with the potential to induce growth on this land.

8. Archaeological and Historical Resources

The local archaeology of Blount County, Tennessee has received little professional attention and, as a result, is poorly defined. The Tennessee Division of Archaeology, located in Nashville, has identified and recorded relatively few sites in Blount County. These sites were identified by a number of different individuals and agencies and do not include a complete representation of the cultural development of the study area. More details on the information that does currently exist is located in Appendix D of this Draft EIS.

Under the no federal action alternative, as the population increases and waste treatment needs rise, some in-ground cultural resources are likely to be disturbed during package plant construction, surface discharge line installation and on-lot septic tank installations. Such impacts may not be mitigated because none of the activities under this alternative would be federally funded. No state legislation requires cultural resource eveluation when local or state funds are utilized.

The disturbance or destruction of resources would be greatest in service areas near large and/or permanent water sources where major archaeological sites are most likely to exist. Well-developed floodplains/ terraces will be the most sensitive areas. At present, a total of 43 unconfirmed and 10 confirmed archaeological sites have been discovered within the study area by intuitive survey methods. All are located along major water sources and lie on floodplains or terraces.

The renovation of failing on-lot systems and the construction of sand mound systems under the on-lot alternative should not seriously affect cultural resource integrity. Under these actions, very few additional undisturbed areas will be impacted.

It should also be noted that while historical resources are not usually impacted by sewer line installation, construction may present both direct (physical damage) and indirect (natural setting disruption) impacts.

Wastewater disposal methods outlined under the small community systems alternative will not greatly affect cultural resources. By land application of waste to some areas, in-ground cultural remains might even be protected from further agricultural-related and natural degradation. There is a possibility, however, that altering soil hydrology by land application of solids or liquids may create slight adverse effects for in-ground cultural resources. When considering discharge of wastewater to the nearest river or stream under this alternative, some adverse impacts to cultural resources could arise as a result of installing discharge pipelines. It is anticipated that these lines will be of minimal length and that any adverse impacts to cultural remains can be mitigated by survey and testing measures.

Installation of interceptor lines proposed for the Maryville/Alcoa suburban alternative should not impact any known cultural resources. However, it is likely that much of the impact of installation of this alternative would occur in previously disturbed areas. Greater effects may result from population growth encouraged by the presence of waste treatment services.

Under the limited 201 alternative, impacts to cultural resources would be mixed. Direct impacts would be minimal in areas where sewer lines follow previously disturbed road grades. Sewer line installation would have considerably greater potential effects for impact zones, including floodplain areas along the Little River where 27 sites (26 unconfirmed and 1 confirmed) have been discovered. None of these known resources would be impacted, but, based on physiographic similarities between the northern and southern portions of the Little River, cultural resources would probably be discovered in the southern floodplains of the lower eastern County area. Similarly, most of the Townsend/Kinzel Springs subarea which will be affected by interceptors is also expected to be sensitive.

Impacts resulting from future growth are of particular concern when considering historic structures. These resources can be directly damaged by clearing activity or indirectly impacted by disruption of the natural setting.

Under the 201 alternative, direct impacts would be minimal in areas where interceptor lines follow previously disturbed road grades. Interceptor line installation would have greater impacts in floodplain areas, particularly along the Little River. Four of the 27 sites along the Little River are within the 201 alternative service area.

Population growth associated with the 201 alternative service areas will disturb resource areas along permanent natural water sources with resulting damage and disruption to archaeological resources. At present, 53 sites have been identified in such areas: 27 in the Maryville/Alcoa periphery, 18 in the Nails Creek subarea and 8 in the northwestern portion of the County. Impacts to these resources can be mitigated by survey and testing programs.

While much of the aforementioned activity will not impact historic structures, activities associated with land development can have impacts. During development historic structures may be physically damaged or destroyed, or indirectly impacted by visual disruption of natural settings.

9. Odor

No major odor problems exist in the study area. What problems there are, are basically due to localized malfunctions of on-site sewage disposal systems. This would occur more frequently in rural areas where on-site sewage disposal is used more extensively than in more urbanized areas. There are documented cases in the study area of localized odor problems due to malfunctioning disposal systems. These, however, have been minor occurrences.

Another potential cause of odor problems in the study area is roadside dumping of solid waste. Despite widespread occurrence of this problem, no major odor complaints have been received. Roadside dumping tends to be more an aesthetic problem and a possible health hazard rather than a cause of odor problems.

In areas that remain on on-lot systems or use package plants, odor would not be a problem unless there are system malfunctions. This situation is likely to be improved if an on-lot management agency is implemented in Blount County to renovate existing septic failures.

PART C - MITIGATIVE MEASURES

This section examines the potential adverse impacts identified above and proposes different actions that can be taken to mitigate these effects.

1. Population and Land Use

Impacts on land use in the study area would be associated with both the 201 plan and limited 201 alternatives. The limited 201 alternative will not service large areas of undeveloped land, however, it proposes interceptor sewers through areas proposed in the County's land use plan for rural residential development. The full 201 plan besides extending facilities through undeveloped rural land, includes service to a land area much greater than that needed to accommodate the population growth that has been projected. Under both alternatives the result could be the development of land planned for agriculture, forest, open space or low density, rural residential use. In particular, the 201 Plan provides for sewer service in Townsend to many hundreds of acres of undeveloped land that would not be developed unless significant excess growth takes place.

A number of measures can be taken to mitigate these impacts, some of which have been integrated into the design of the alternatives while others are supplemental to them. For one, force mains could be used instead of gravity sewers for all long interceptors. This approach makes intermediate hook-ups along the interceptor route more difficult, lessening the pressure for development and resulting sprawl. Grant conditions can also be utilized to prohibit the hook-up of areas not proposed for development. Also, a variety of measures can be adopted by the County and affected cities to reasonably control development and direct growth in a manner consistent with the County land use plan. A zoning ordinance would be the initial step towards directing development. If necessary this regulation could be supplemented with a floodplain ordinance, staged growth policies, use of easements and other more restrictive development controls to assure that sewers and other public utilities are extended to the proper places at the appropriate time and that land development takes place in the desired areas.

The on-lot system alternative would also not be entirely consistent with the County land use plan in that it could result in slightly lower densities for residential development adjacent to Alcoa and Maryville. Also, the rural centers proposed further out in the County would not be encouraged. The adoption of a zoning ordinance could assist in encouraging clustered development in the rural areas. Residential density adjacent to the cities, however, would be limited by soil suitability for on-lot disposal and the availability of other wastewater disposal techniques such as local funding for tie-in to a nearby regional transmission system.

2. Surface Water Resources

The alternatives that include surface water discharge from small community treatment systems could potentially result in adverse impacts on water quality of the receiving streams. This impact could be mitigated in a number of ways. One would be to relocate discharge points further downstream, away from headwaters locations to assure sufficient dilution of effluent even during low flow periods. Including dechlorination in the treatment systems proposed for these plants would also lessen the possibility for toxic effects on aquatic organisms. Overall, the most significant action that could be taken would be to assure proper operation and maintenance of these plants to ensure compliance with discharge permits. Requiring a licensed, fulltime operator to be at the plant and some form of daily or more frequent sampling of effluent would be effective measures.

Direct impacts on water quality would also result during construction of interceptors across and along streams. Removal of stream bank vegetationand excavation can result in temperature changes and increased turbidity in the stream. These impacts can be mitigated through interceptor design which minimizes stream crossings and leaves a buffer of vegetation between pipeline routes and stream banks. A minimum distance of 30 feet is recommended to avoid possible damage to tree roots. During construction, all significant trees should be marked and avoided, and haybales, sediment basins and other erosion control methods should be employed. Disturbed areas should be regraded and seeded to native vegetation as soon after construction as possible. Management practices such as these should be specified in a sediment/erosion control ordinance but at present, Blount County does not have such an ordinance. Any grant of federal funds could be conditioned to require the development of an ordinance or the use of erosion control practices during construction.

No impacts to water quality have been attributed to the treatment and disposal of wastewater using on-lot systems. As the number of these systems increases in the future, however, there are a number of measures which could be taken to assure maintenance of water quality.

Continued strict enforcement of County regulations governing subsurface disposal would be a first step towards water quality preservation. It is also recommended that further provisions be added to these regulations requiring a greater setback of systems from the Little River of 100 feet.

Since these regulations focus on design and installation, malfunctions or other system problems are only addressed when they result in a violation of the health code. To solve this problem, it is recommended that an on-lot system management as discussed in Chapter II, be implemented. The existence of such an agency would provide further assurance of proper system design and installation and in addition, would better control operation and maintenance. In this way, on-lot systems would continue to function as designed, assuring adequate renovation of wastewater by the soil. Some of the ways in which this agency could be organized have been discussed in Chapter II. Other information is provided in the following chapter.

Indirect impacts to surface water quality will also result from nonpoint source loads. In most portions of the study area, future development supported by wastewater facilities will result in a change in land use from the existing agriculture or forest use. Although certain nutrient and bacterial pollutants associated with agricultural use will be lessened, the urbanization of land typically results in the introduction of organics, oil and gasoline, suspended sediments and significant changes in average and peak stream flows. A variety of stormwater management and site development measures can mitigate these nonpoint source impacts somewhat. Retention basins, rooftop retention, porous paving streets and catch basin cleaning all help to lessen the impact of nonpoint source loads. Siting restrictions on final slope steepness, parking lot and developed acreage areas all help to control the rates and quality of stormwater runoff. Measures such as these should all be considered for use in the Townsend area in order to mitigate the potential adverse impacts of development on the Little River.

Mitigative measures can also be implemented to reduce nonpoint source loads from agricultural areas. Types of agricultural nonpoint source control measures include:

1) erosion control practices to reduce losses of topsoil
2) methods to enhance water infiltration and storage on agricultural lands
3) modifications of fertilizer, pesticide and herbiade application practices.

Erosion control practices include no-till planting, conservation tillage, meadow-less rotations, winter cover crops, various field contouring methods and optimum timing of field operations. Water infiltration can be enhanced by the use of as much vegetation cover as possible, the use of small infiltration basins or ditches and applying lime to clay soils. Fertilizer and pesticide application practices can be developed to avoid wasteful applications and to minimize use of persistent or ineffective pesticides. Crop planting and rotating practices can also help to minimize inefficient use of fertilizers and pesticides. Most of these measures can reduce costs to farmers and reduce the extent of adverse water quality impacts.

3. Groundwater Resources

Certain impacts to groundwater have also been identified for the alternatives. As all alternatives provide for some continuation of on-lot disposal systems, the potential groundwater impacts of these systems would be associated with all alternatives. Groundwater problems have been limited in Blount County and those identified have not been attributed to domestic wastewater disposal systems. However, inadequate renovation of wastewater especially in Karst areas with solution channels could provide a direct means of contact between pollution sources and groundwater. This potential can be mitigated through thorough soil testing and design of adequate disposal fields. Particular consideration should be given to the thickness of permeable soils, the depth to the seasonally high watertable and the distance to bedrock. In areas with shallow soils or high watertables, elevated mound systems may be preferable to insure protection of groundwater. In addition, water conservation measures that result in reducing flows to subsurface disposal fields could also lessen potential system failures and groundwater impacts.

Groundwater impacts would also be associated with those alternatives that include land application of treated wastewater. As mentioned in Part B above, use of slow rate application would lessen the potential to impact groundwater supplies. A thorough evaluation of soil, groundwater and bedrock characteristics would also help mitigate impacts by identifying locations for application fields where soil depths are adequate and bedrock fractures and solution channels are not present.

4. Biological Resources

Adverse impacts on biological resources in the study area would result primarily from the direct effect of wastewater discharges and the indirect impact of habitat removal caused by growth and development. Nonpoint source runoff from development would also have an effect on aquatic resources. Use of land application instead of surface water discharge would be the most reliable way of mitigating the potential impact of wastewater discharges on aquatic organisms. Land application, however, does result in modification to the terrestrial habitat but only over a limited area. Other efforts mentioned with regard to mitigating water quality impacts would also apply here: Vigilant operation and maintenance; dechlorination; and consideration of filtration or other methods for removing phosphorus and other nutrients to lessen algal growth. Limiting wastewater discharge to the larger or less productive water bodies would also lessen impacts. Nonpoint source pollution loads can be limited through the stormwater management measures noted above as well as through certain development controls. As the Little River is such a critical environmental resource within the study area it is crucial that such controls be adopted in Townsend to protect the river from growth-induced impacts.

Impacts to terrestrial organisms as a result of habitat removal would result primarily from those alternatives that would support excessive growth and development. This would be most pronounced where service areas include extensive forest land. Actions to mitigate these impacts would include local controls on development such as zoning and subdivision ordinances. Subdivision controls that specify percentages of dedicated public open space required for each subdivision can assure that a certain amount of natural area is set aside during development. Other local environmental siting controls can also be helpful.

5. Community Services and Facilities

The provision and availability of community services will also be affected by the selection of wastewater management facilities for the study area. Most of the alternatives are generally consistent with the County land use plan and hence, will not support growth and the demand for public services in areas where services are not proposed or where their provision would be costly. However, where extensive growth does occur in areas removed from existing service centers such as in Townsend, an impact on the cost and availability of public services may result. It is difficult to mitigate this impact except by eliminating sewer service to areas without adequate services or by adopting some form of adequate public facilities ordinance. Such an ordinance would work jointly with the local subdivision ordinance to limit future subdivision in areas until adequate public facilities can be afforded and provided. In some cases, it is also possible to have private developers provide some of the needed services when an area is developed.

6. Economics and Employment

None of the alternatives being evaluated in this EIS have been found to result in any adverse impacts on the local economy or level of employment. Each alternative would provide some short-term increase in local construction activity. Some alternatives would provide a substantial subsidy to future industrial and commercial growth.

7. Environmentally Significant Agricultural Lands

An important natural resource that will be affected by the implementation of wastewater facilities is environmentally significant agricultural land. There is a great deal of prime farmland and other agricultural land classified as environmentally significant within the Blount County study area. As a result, nearly every alternative will have some impact on the stock and availability of this land. Under the on-lot systems alternative no specific area of significant agricultural land will be affected but since the overall density of development will be lower, more acres would eventually be developed.

The small community alternative would directly impact agricultural land by utilizing these areas for effluent application. Indirect impacts would also result from the alternative as well as the limited 201 and 201 plan alternative where the areas proposed for sewer service are classified as significant agricultural land.

Mitigation of these impacts can be achieved in a number of ways. With on-lot systems, mitigation would primarily be a local action utilizing some form of development control as mentioned previously. The direct impact from land application systems can largely be avoided by using some form of slow rate system such as spray irrigation which would allow concurrent farming use of the site. Where interceptor service areas pose the threat of converting significant agricultural land, this can be overcome by revising service area boundaries and system capacity, by incorporating conditions on the federal grant limiting hook-ups on significant agricultural lands or by instituting some form of development control ordinance.

8. Archaeological and Historical Resources

Archaeological and historical resources within the study area are also vulnerable to the direct and indirect effects of wastewater facility construction. Under all of the alternatives except for no federal action, federal regulations would require that measures be undertaken to mitigate adverse impacts to cultural resources. The direct impact of wastewater facilities as well as the indirect impact of induced growth could be minimized by such actions as variation in the design of facilities and service areas, cultural resource surveys and documentation and excavation and removal of archaeological artifacts. Such actions would not be required for locally funded facilities.

Potential impacts to cultural resources would be greatest along the Little River and in floodplain areas in the eastern County area. Preconstruction surveys and excavations would be most valuable where discharge pipes or interceptors traverse floodplain terraces and where service areas include substantial undeveloped acerage.

A general effort which would be valuable regardless of the alternative selected would be to undertake a detailed survey of cultural resources in Blount County. This documentation of all existing resources would limit potential impacts even if wastewater facilities were not federally funded. Further protection of cultural resources would be achieved if an historic preservation plan was adopted for the County.

9. Odor

No major odor impacts have been identified for any of the alternatives. Odor problems associated with failing on-lot systems can be limited through proper design, operation and maintenance. Attention to these same actions can insure compliance with permit requirements and avoidance of odors at wastewater treatment plants.

CHAPTER 4

CHAPTER IV

SELECTION AND DESCRIPTION OF THE PREFERRED ALTERNATIVE

PART A - DESCRIPTION OF THE PREFERRED ALTERNATIVE

EPA has selected on-lot systems as the preferred wastewater management alternative for the Blount County study area. The selected alternative is alternative 2 if the local citizenry desires a management agency or alternative 1 if the establishment of such an agency is not deemed to be appropriate for Blount County by local residents and their elected officials.

These alternatives would provide management of wastewater in most portions of the study area using mainly on-lot treatment and disposal systems. It may be appropriate for the responsible local agencies to extend collection sewer lines to specific areas near existing interceptor lines where cost and soil conditions dictate. Costs for such lines would be funded with local funds. For alternative 2, the first component of the alternative is the federally funded renovation of existing on-lot systems which are found to be malfunctioning or failing. It has been estimated that 1,680--about 15% of all existing systems--may need renovation, based on discussions with officials of the Blount County Health Department and the results of a remote sensing study conducted by EPA's Environmental and Photographic Interpretation Center. The actual number of system renovations may vary from this estimate, and a detailed evaluation of these systems will be necessary to accurately determine the systems in need of renovation.

The second component of this alternative is the non-federally funded development of on-lot systems to accommodate the wastewater needs of future development in the study area. Federal regulations do not allow grant money to be provided for development of new on-lot systems; therefore, the systems would need to be built and paid for by developers and homeowners as is now the practice.

A small community land application system was considered for Townsend. At this time, the decision is made not to provide federal funds for this component of the alternative. If at some point in the future, development in Townsend reaches a level where wastewater management needs can not be met using well managed on-lot systems, EPA will reconsider the decision to fund a small community land application system in Townsend. The decision concerning federal funding in Townsend will not be affected by the presence or absence of an on-lot management system in the County.

The renovation of existing on-lot systems in the study area could involve a number of different actions depending on the source and severity of existing problems. Current failures and malfunctions typically result for one or more of the following reasons:

- Soil restrictions including permeability, depth to bedrock or depth to seasonal high water table
- Undersized absorption field
- Wastewater is not being evenly distributed across an absorption field
- Absorption fields are not rested periodically nor otherwise operated or maintained on a regular basis
- Flows to absorption fields have increased beyond design capacity
- Septic tanks have not been pumped out in 5 years or more
- System designs may not meet Tennessee regulations and/or EPA-approved guidelines
- System installation techniques may not follow design specifications.

A variety of remedies which could be taken to eliminate system problems are noted on Table IV-1. In addition to these remedial actions, it may be necessary at some sites to expand septic tank or drainfield sizes, put in new systems, and in locations with soil restrictions, raised mound systems may be needed.

EPA regulations stipulate that federal funding for on-lot disposal systems may only be approved if a local on-lot management agency is in place to regulate the design, installation, maintenance and operation of

TABLE IV-1

POSSIBLE PROBLEMS AND CORRESPONDING REMEDIES FOR ON-LOT SYSTEMS

Problem	Remedy(ies)	Significance to Overall Operability
Improper siting	Artificial drainage, regrading and filling, holding tank, or total reconstruction	High
Overloading	Repair plumbing, reduce flows generated within the home (or business) or eliminate inflow from foundation drainage	Medium
Scum and/or sludge accumulation	Remove materials from septic tank	Low
Improper design or construction	Periodically dose and rest the disposal area, add more absorption area, remove clogging of absorption area with hydrogen peroxide, remove accumulations within distribution piping, reconstruct part (or all) of the system, or abandon the site	High
Use during wet periods	Direct surface runoff	High
	Intercept seasonally high groundwater	High
	Increased fill or mound absorption area	Medium
	Eliminate discharging foundation drains	Medium
	Divert rooftop down spouts discharges away from absorption area	Medium
	Reduce wastewater generation by repairing leaky fixtures and adding flow reducers	Medium

these systems. It would be necessary, therefore, for such an agency to be established in Blount County prior to approval of federal funds for on-lot renovations. This action is discussed in detail in Section B, following.

Locally funded on-lot systems for future wastewater needs would also need to utilize a wide range of technology options to insure adequate renovation of wastewater and maintenance of water quality. Technologies which could be utilized include the following:

For wastewater treatment:
  1) septic tank
  2) sand filter
  3) aerobic treatment

For wastewater disposal:
  1) conventional soil absorption
  2) sand mound

For sludge (septage) disposal:
  1) regional wastewater treatment plant
  2) controlled landfill

Selection of on-lot treatment and disposal methods will need to be made for each household and business based on soil conditions, proximity to water supply wells and other limiting factors. A septic tank-soil absorption system would be implemented wherever limiting factors are not significant, because these technologies have the lowest costs. Variations of technologies such as dual absorption fields, could also be installed. More innovative systems should be implemented where soils or other factors are limiting. The existence of a management agency could further assure that design, installation and maintenance of future systems using any technology be performed adequately.

Total net present worth of this alternative is estimated to be about $13.0 million if a management agency is established. This figure includes costs to renovate 1,680 existing on-lot systems which would be 85% federally fundable, and costs for the on-lot management agency and future on-lot systems through the year 2000, both of which are not eligible for federal funds.

Based on this division of funding for alternative 2, total annual costs to be handled by local sources is estimated to be about $1.37 million per year. Distributed uniformly over the population to be served, this annual cost results in a service charge of about $100 per household per year in unsewered areas and $118 in sewered areas. The average annual household costs for on-lot systems in other alternatives is about $40 per year, therefore, these service charges represent about $60 per year in additional costs to support the management agency. However, with these added costs comes the security to each homeowner of having most maintenance and minor repairs to his on-lot system covered by the management agency.

This estimate of annual costs and the way in which they are distributed to users reflects only one approach that could be employed. This particular approach was used because it is consistent with costing for the other alternatives where all project costs are capitalized at the time the project is begun and all operation and maintenance costs are carried by the public sector. For on-lot systems a more traditional approach would be for project costs to accrue during the planning period as new homes are built and new on-lot systems constructed. It is also more typical for these project costs and the operation and maintenance costs for these systems to be borne by the private sector (the homeowners). With these charges and a variety of other options, the user charge for unsewered areas of alternative 2 can be decreased substantially. In fact, it is conceivable that the only additional public cost associated with this approach could be the administrative costs of the management agency.

If future on-lot systems were paid for by homeowners and the financing costs for these systems removed from the public sector, total annual costs would fall to $1.07 million with a user charge of $70 per household.

If an extended inspection cycle with a five year interval were possible, it would decrease total annual costs further to $942 thousand and user charges would fall to $58 per household.

If the overall concept for the management agency were revised so that all operation, maintenance and project costs were paid for by the homeowner, the only responsibility for the management agency would be administering the program. In this case, the total annual costs for alternative 2 would drop to $530 thousand. Based on this concept, the remaining user charge for unsewered areas would be about $18 per year. This charge would only cover management agency administrative costs. Each homeowner would still be responsible for regular operation and maintenance costs for each on-lot system as well as any renovation, replacement or other additional maintenance or operation actions required as a result of management agency-authorized inspections.

As these examples show, there are a wide variety of options in design and cost allocation for the management agency. The decision as to which approach is most appropriate is for the citizens of Blount County and their elected officials to decide.

PART B - MITIGATIVE/ENHANCEMENT MEASURES

Improper siting and maintenance practices are the major reasons for on-lot system malfunctions. Local agencies often lack time and resources for proper enforcement of on-lot system design and installation guidelines; the task of utilizing site data and system designs for effective enforcement is difficult. In addition, local authorities are sometimes pressured into approving the construction of the least expensive on-lot systems on poor or marginal soils. Furthermore, the more innovative on-lot technologies such as on-lot sand filters, aerobic treatment and sand mounds have not been implemented to any significant extent within the Blount County EIS study area to date. Finally, maintenance of on-lot systems is often ignored by the homeowner until a problem develops. Pumping out systems on a regular basis would help prolong the life of many systems within Blount County.

In order to help Blount County alleviate septic tank problems which have built up over the years, EPA would provide funding for a one-time renovation program addressing documented failures of existing on-lot systems. As EPA regulations require, this program could not receive federal funds unless an on-lot management agency is set up locally. To qualify, this agency would have the power to enforce appropriate siting and maintenance requirements to alleviate the problems discussed above.

The cost to the citizens of Blount County for this agency could vary as discussed in the previous section. A reasonable estimate of average yearly costs would be between $35-40 per year per homeowner. The Blount County homeowner would receive for this expense a regular maintenance program for his system and the assurance that his system would last to the maximum potential life time. He would also be assured that new on-lot systems in the County will be installed properly and that public health and aesthetic problems associated with the surfacing of effluent and its accompanying odors will be greatly minimized in the County. The citizens of Blount County and their elected representatives must determine if these costs are worth the associated benefits.

Basically, the on-lot management agency would be responsible for all existing and future on-lot systems within the study area including:

- Renovation of existing, failing systems
- Site evaluations and system designs
- Periodic inspection and maintenance of all on-lot systems
- Infrequent troubleshooting of malfunctioning on-lot systems
- Overseeing all other on-lot system activities conducted by professional engineers and licensed installers.

A number of options are available for: 1) allocating efforts among the managing agency, professional engineers and licensed installers, 2) financing the efforts and 3) determining which existing department (if any) would become the managing agency. Decisions about these matters will be made at the local level (with EPA assistance, if desired). One possible allocation of effort to address the first option above is presented in Table IV-2. Table IV-3 presents some on-lot management options. Other

TABLE IV-2

POSSIBLE DUTIES ASSOCIATED WITH MANAGEMENT OF ON-LOT WASTEWATER SYSTEMS WITHIN THE BLOUNT COUNTY, TN EIS STUDY AREA

	Primary Management Agency	Registered Professional Engineer	Licensed System Installer
Preliminary Design	X		
Percolation Tests and Site Evaluation	X		
Permit	X		
Design and Review of Field Data		X	
Review of Design	X		
Installation			X
Construction Management	X	X	
Periodic Inspection	X		
Periodic Maintenance	X		X
Infrequent Troubleshooting	X	X	
Public and Interagency Information	X		
Environmental Monitoring	X	X	

TABLE IV-3

SOME ON-LOT MANAGEMENT AGENCY OPTIONS

1. Duties of management agency, professional engineer and system installer (see Table 2).

2. Primary management agency:

   - Blount County Health Department;
   - Blount County Utilities Board;
   - Alcoa Utilities Board;
   - Maryville Utilities Board; or
   - A new agency.

   Revisions to county regulations may be needed.

3. Personnel:

   The following comprise the scenario on which costs are based:

Civil/sanitary engineer	1
Soil scientists	1.5
System inspectors	2

   to handle management needs only.

4. Local financing options:

   - Different fees for each system based on services provided;
   - User charge assessed uniformly throughout the study area;
   - Some combination of these two options.

5. Permitting and inspection procedure considerations:

   - Permit renewal frequency;
   - Engineering and installation reports;
   - Checklists for field efforts, design, installation and inspection;
   - Penalties for non-compliance;
   - Easement or ROW requirements;
   - Alternative vs. conventional systems.

considerations which are important to establishing an on-lot management agency, such as authority which the agency will need, are presented in Table IV-4. Table IV-5 presents assumed costs for the proposed Blount County on-lot management agency.

If at some point in the future, the Townsend small community system component of this alternative is implemented, there will be a potential for significant indirect impacts to the Little River. Development in Townsend supported by this system will result in an increase in impermeable surfaces from parking lots, sidewalks and buildings. Base flows in the Little River may decrease while storm flows increase, carrying higher loads of suspended solids, oils and grease and raising the stream temperature. Such effects could be mitigated through the adoption of some form of land use regulations and site development controls. Most important would be the limitation of development within the Little River floodplain and recharge areas if these are present. Site development controls could limit grading and final site contours, channelization and other alteration of drainage patterns, and lot area coverage. Some form of stormwater management program could significantly reduce adverse impacts of development. Such a program could include the use of detention basins, permeable paving and street and parking lot cleaning to lessen storm flow peaks and the pollutant load of these flows.

Without these controls, other developing tourist/recreation areas have seen the very resources that attracted the tourists lost to environmental decay. To avoid this result, any development in Townsend must be accompanied by adequate controls.

PART C - TOWNSEND--SUMMARY OF ALTERNATIVES AND ENVIRONMENTAL IMPACTS

One of the primary focuses of this EIS from the outset has been the impact of wastewater facilities on the Townsend area, particularly the Little River. A number of management alternatives were evaluated in the EIS including the provision of wastewater disposal using an interceptor to the Maryville WWTP, small community systems and on-lot systems.

TABLE IV-4

OTHER ON-LOT MANAGEMENT CONSIDERATIONS

- Strong support from the Blount County government and the Blount County Health Department will be important.
- Interactions between the agency and homeowners are quite important. A Homeowner's Guide may be worth the effort needed to prepare.
- Authority is needed to enter private property, perform site evaluations and possibly dig a few test pits.
- Authority is also needed to enter private properties to repair or replace malfunctioning systems.
- Revisions or additions to Blount County and State of Tennessee regulations may be required. As a minimum, verification is needed that no legal conflicts exist.
- On-lot system operating permits can be implemented so as to require renewal every 2 to 4 years when each on-lot system would be inspected. Penalties for refusing to comply could be established and enforced.
- Procedures for securing permits and conducting inspections for existing on-lot systems would need to be developed and implemented.
- The flow of funds to and from the managing agency will need to be monitored. The preferred method(s) for collecting funds will need to be devised and applied.
- Agency professionals may require additional training, particularly with regard to types of on-lot systems not yet employed within Blount County.
- Engineers must be qualified and installers must be licensed to work with all types of on-lot systems to be employed.
- Installers should stockpile parts which are inexpensive or routinely needed for system repairs.
- Installers could be required to submit quarterly activity reports (e.g. maintenance and septage hauling activities - amounts and locations).
- The extent of environmental monitoring to be conducted will need to be established.
- Consideration can be given to performing another remote sensing (aerial photo) study by 1990.

TABLE IV-5

ITEMS INCLUDED WITH A POTENTIAL ON-LOT MANAGEMENT AGENCY FOR BLOUNT COUNTY, TN

*1. Renovation of approximately 15 percent of existing systems (1,680 systems)

- 840 systems renovated by use of conventional on-lot technology ($1,350 construction costs per system)
- 840 systems renovated by use of alternative (sand mound) technology ($3,500 construction costs per system)
- Design and other costs not directly associated with construction are included:

  1) Perc tests/site evaluation
  2) Field effort review and design
  3) Backhoe rental
  4) Construction management, legal fees, insurance

  These costs are approximated to be the same as 30 percent of construction costs.

2. Periodic inspection and maintenance of all on-lot systems: $30 per system per year.

3. Salaries of professionals: $80,000 per year plus 50 percent overhead.

4. Infrequent troubleshooting of malfunctioning on-lot systems in attempts to inexpensively renovate treatment efficiency: $100 per system per year for 10 percent of existing households.

5. Hand-held soil augers: $500 per year.

6. Design and installation of conventional on-lot systems for future homes: $1,750 per system.

*85 percent of these project costs are proposed to be covered by a Federal grant from the U. S. EPA.

The analysis of on-lot system functioning performed as part of this EIS identified very few failures or malfunctions in the Townsend/-Tuchaleechee Cove area. In fact, this area had the lowest rate of observed failures of any subunit within the study area. Information from the Blount County Health Department also indicated that soils are very suitable for on-lot disposal in this area and that few system failures have been reported. Water quality sampling performed as part of this EIS showed high water quality in the Little River and did not identify any water quality impacts related to existing wastewater disposal. A further sampling program conducted by the TWQC has shown continued high water quality even with recent enlargements of tourist accommodations and high rates of usage associated with the Knoxville World's Fair.

Growth and development is taking place in Townsend at a faster rate than in most other parts of the County. However, the overall level of population including seasonal accommodations is fairly low. Based on forseeable indications, it will still represent a relatively small percentage of the total study area population, even by the end of the planning period.

Alternatives 5 and 6 which provide interceptors to Townsend to convey flows to the existing system are first-of-all, not cost effective, given population projections. They could also result in some environmental impacts to the Little River during construction. Most importantly, however, the interceptor to Townsend especially as sized under alternative 6 would have a significant growth-inducing potential on the Townsend area. Both the city of Townsend and surrounding areas under County jurisdiction lack any form of land use or development controls, including zoning, site development standards, stormwater and runoff controls or sedimentation or erosion control requirements. In this situation, induced development in Townsend could create nonpoint source pollution loads in the Little River far in excess of any point sources from wastewater management facilities. The resulting impacts to the river would be extensive.

Alternative 4 would provide a federally funded small community land application system in Townsend. Such a system would be less able to support extensive development of the area because of limitations on treatment and disposal as well as conveyance capacity. However, the cost of this alternative would vary little from an interceptor and it is similarly not considered cost effective at this time.

Based on the above information on soil suitability, existing system operation, water quality and future development, it is concluded that well managed on-lot treatment and disposal systems are the most cost effective, environmentally acceptable wastewater management system for the Townsend area. Present systems are not resulting in water quality problems. There is land with suitable soils available for the projected future development and these systems can be readily afforded by homeowners. On-lot systems are also feasible for moderate scale commercial, tourist oriented development. If large-scale development does occur in the future, either private developers or local or federal government agencies are still free to implement a small community land application system.

CHAPTER 5

CHAPTER V

EIS COORDINATION

PART A - INTRODUCTION

The purpose of this chapter is to document the interaction and communications between EPA and its consultants with affected segments of the local community. A wide variety of mechanisms have been employed: A public scoping meeting, a review committee, informal small group meetings with officials and private groups, letters, telephone calls and various handouts. An effort has been made to solicit input from a wide spectrum of community interests, to keep each group informed of study progress and to bring together conflicting points of view.

The first sections of this chapter document coordination with other public agencies. Thereafter, the public participation program is described.

PART B - COORDINATION WITH LOCAL, STATE AND FEDERAL AGENCIES

Throughout the EIS process, many agencies have been invited to participate in the review of outputs and to comment in areas of special expertise and legal authority. Table V-1 lists the agencies which have been contacted. The comments of all of these agencies have been incorporated into the Draft EIS. No problems are anticipated related to the potential impact of the selected action in this EIS with the concerns of any of these agencies.

PART C- PUBLIC PARTICIPATION PROGRAM

Public participation programs are mandated by federal regulations governing the preparation of Environmental Impact Statements. Public participation is an important and valuable part of the EIS process because it provides for active public involvement in developing and evaluating wastewater management alternatives.

TABLE V-1

AGENCY COORDINATION LIST

State of Tennessee

Tennessee Department of Conservation, Division of Archaeology
East Tennessee Development District
Tennessee State Planning Office
Tennessee Department of Conservation, Tennessee Historical Commission
Tennessee Department of Highways
Department of Health, Water Quality Control Division
Department of Health, Division of Environmental Sanitation
Tennessee Department of Conservation, Tennessee Heritage Program
Tennessee Department of State Planning

United States Government

Department of Agriculture, Soil Conservation Service
Department of Agriculture, Cooperative Extension Service
Tennessee Valley Authority, Water Quality Branch
Tennessee Valley Authority, Community Planning Division
Department of Commerce, Bureau of Economic Analysis
Department of Commerce, Bureau of the Census
Department of the Interior, Fish and Wildlife Service
Department of the Interior, Geological Survey

Local Agencies

Blount County Planning Commission
Blount County Health Department
Blount County Chamber of Commerce
Blount County Assessors Office
Friendsville Water District
City of Townsend
South Blount Water District
Tuchaleechee Utility District
Maryville Utility Board
Maryville City Planning Department
Alcoa Planning Commission

A public scoping meeting was held December 18, 1979 at the Blount County Courthouse, Maryville, Tennessee. The meeting had several purposes including informing the public about the EIS, the further definition of the scope of the study, the solicitation of public input concerning the major study issues and the development of a list of individuals interested in serving on the Citizens Review Committee (CRC). Major issues raised at the meeting concerned the effects of providing wastewater facilities on growth and development in the Townsend area and the pros and cons of expected growth.

The focal point of the public participation program was the establishment of the Citizens Review Committee. This group is serving in an advisory capacity to EPA and our consultants. The CRC is composed of 16 members representing a wide spectrum of interests throughout Blount County. The members of the CRC and the organizations they represent are listed on Table V-2.

Specific functions and duties of the group include:

- Identifying local planning and environmental objectives
- Identifying study area issues and conflicts regarding wastewater management and environmental conditions
- Reviewing all task report submissions
- Assisting in the development and evaluation of wastewater management alternatives

The Citizens Review Committee is meeting at project milestones throughout the development of the EIS. The first meeting took place on July 17, 1980 to review the Plan of Study. Comments and recommendations of the CRC were recorded for further discussion and incorporated into the Plan of Study.

The second meeting of the CRC was held on January 21, 1982. The purpose of this meeting was to discuss the Environmental Inventory Report, The Alternatives Development Report and the Environment Survey Report. The discussion of the group centered on the suitability of the various

TABLE V-2

BLOUNT COUNTY EIS
CITIZENS REVIEW COMMITTEE

Member	Alternate	Representing
Bob Allen	Ray Payne	Sierra Club
Mickey Bentley	David E. Buck	City of Alcoa
Bill Dunavant	Leon Downey	Chamber of Commerce Blount County
Wayne P. Everbach		Trout Unlimited
Gail P. Harris	James C. Harris	Private Citizen
Andy Jordan	Joe Irwin	City of Maryville
John McArthur	James L. Frederick	Alternatives for Blount County
David McKinney	Earl Leming	Tennessee Water Quality Control
Fred Metz	Tony Abbott	Blount County Planning Dept.
Ruth H. Neff	Carol Nickle	Tennessee Environmental Council
Bill Stroud	Ronald Peach	Local Business and Industry
Bob Sullivan	Art Swan	Smoky Mt. Visitors Bureau
Bill E. Wear	Kyle Middleton	Tennessee Chamber of Commerce
John Webb	Harry H. Kidwell	City of Townsend
Dennis W. Weeter	Greg Reed	University of Tennessee
Paul G. Worley	Clyde McMahan	Blount County Utilities Board

alternatives which were identified for wastewater collection, treatment and disposal in Blount County. The CRC was generally satisfied with the level of effort which had gone into the analysis and the conclusions which were reached.

The next meeting was held on June 1, 1982. The purpose of this meeting was to discuss the Alternatives Evaluation Report. The level of analysis, assumptions and conclusions in the report received a very positive response from the CRC. No overall concensus was reached by the group concerning which alternative should be selected. It was generally agreed by the group, however, that extensive growth and development in the Townsend area should not be encouraged without land use controls geared to protect environmental quality.

The fourth meeting of the CRC was held on August 11, 1982. The purpose of this meeting was to describe EPA's preferred alternative in the Draft EIS and discuss impacts expected with the implementation of this alternative and measures which could be used to mitigate projected adverse impacts.

CHAPTER 6

CHAPTER VI

LIST OF PREPARERS

PROJECT PERSONNEL

U. S. ENVIRONMENTAL PROTECTION AGENCY

Robert B. Howard	Chief, NEPA Compliance Section
Gene Raybuck	EPA Project Officer, August 1979 - January 1981
Robert C. Cooper	EPA Project Officer, January 1981 - Present
Robert J. DeRosa	201 Project Engineer

GANNETT FLEMING CORDDRY AND CARPENTER, INC.

Thomas M. Rachford	Senior Project Manager
Anthony G. Neville	Project Manager, August 1979 - January 1982
Stuart L. Miner	Project Manager, February 1982 - Present
David B. Babcock	Engineer
James R. Fuller	Engineer
John W. Jacobs	Soils Scientist
Amy E. Lucas	Environmental Scientist

CLAUDE TERRY AND ASSOCIATES, INC.

Claude E. Terry	President
Robert J. Hunter	Project Manager/Environmental Scientist
Michael Brewer	Environmental Scientist
James C. Hodges	Environmental Scientist
Thomas C. Mather	Environmental Scientist
Louise B. Franklin	Environmental Planner
Steven S. Webb	Archaeologist

APPENDICES

APPENDIX A

POPULATION AND WASTEWATER FLOW PROJECTION METHODOLOGIES

The purpose of this appendix is to provide the underlying methodologies for the population values presented in Chapter 3 and for the wastewater flow projections presented in Chapter 2.

Appendix A is presented step by step beginning with the disaggregation of 1980 populations into the various population districts comprising the study area. The methodology for projecting populations through the year 2000 is then presented. The year 2000 is considered a cutoff year because the U. S. EPA considers 1980 to be the beginning of the 20-year planning period. Federal regulations require the use of a 20-year planning period for preliminary design of wastewater facilities. Seasonal populations are then presented because such populations are considered to be significant in the Townsend area. The methodology for flow projections is presented last only because the flow projections themselves are based in part on the population projection numbers.

A.1 Study Area Population Disaggregation and Projections

Issue Summary

- New population estimates are needed for the Blount County study area outside of the cities of Maryville and Alcoa.

- These estimates are one ingredient for estimating sizes and, to some extent, locations of alternative future wastewater facilities.

Objective of this Section

- To outline the tools, procedures and results of allocating populations to the various portions of the study area and projecting future populations.

- Projections developed in the 201 Wastewater Facilities Plan are considered by EPA to be inappropriate.

- Both year-round populations and seasonal populations must be considered.

A.1.1 Outline of Approach

The environmental inventory population task identified and reviewed available population disaggregations and projections for the EIS study area to determine their adequacy for use in the EIS. As a result of this review, it was determined that new projections should be developed in order to be consistent with state and regional projections and that these projections should be disaggregated into watershed areas for greatest use in developing and evaluating alternative wastewater management facilities.

The year 2000 population for the entire County was taken from EPA-approved figures developed by the Bureau of Economic Analysis. This figure of 92,000 was then used as a control total to limit the combined populations for the study area, Maryville and Alcoa and the remaining County area for the year 2000.

Population within the study area was disaggregated into subareas referred to as population districts. Figure 3-1 shows the boundaries of the population districts. These areas were based mainly on drainage patterns but also reflect political boundaries. For the most part, the population districts used were identical to those developed in the 201 plan. In some areas, however, further subdivisions were made where it was felt this would create separate areas of more homogeneous growth rates.

A.1.2 1980 Populations

The present (1980) population in each of the population districts was developed by using a house count taken from the aerial photographs flown in October 1980. The house count was performed by EPA's Environmental Photographic and Interpretation Center (EPIC). The count included all single family dwellings and the estimated number of dwelling units in multifamily structures. These house counts were then converted to population by applying an average persons per household figure.

The figure for persons per household was determined separately for each County division within the study area. In each case, the same technique was used: total housing units identified in the 1980 Census of Population were divided by the total population in 1980. Such an approach accounts for unoccupied dwellings. The persons per household rate obtained in this manner for the County divisions was:

Binfield	2.75
Frindsville	2.66
Lanier	1.61
Maryville/Alcoa	2.60
Townsend	1.93
Wildwood	2.63

In the Maryville/Alcoa division, only data for the area outside the city boundaries were used. The house counts in each population district were then converted to populations using the rate for the County division in which the majority of each population district was located. These 1980 population totals are shown on Table 3-1 of this EIS.

A.1.3 Population Projections Through the Year 2000

Future populations in each district were projected by 5 year increments to the year 2000 using a comparative forecasting technique. This methodology assumed that future population in an area can be estimated by applying a growth rate identified in another area with similar characteristics. In this case future growth rates for the population districts were established based on growth rates for other similar areas in Blount County. For example, it was assumed that a population district which was distant from Maryville/Alcoa and Knoxville with no water or sewer availability, poor accessibility, little buildable land and poor internal circulation would grow in the future at the same rate as a sample area which was chosen with the same characteristics. In each case, growth rates were expressed in terms of population density so it was possible to compare areas of similar density but varying total populations. Ideally, the comparison of growth rates established future growth in population districts based on historical rates in the sample areas. In some cases, however, it was necessary to extrapolate sample area growth rates and base a portion of the population district forecast on that extrapolated rate of growth.

Each sample area was a five square mile circle chosen as representative of different growth-controlling parameters as possible: existing level of development, infrastructure availability, location, accessibility, buildability. Population in each sample area was determined using house counts from historical aerial photography and applying persons per household rates. Because of limited aerial photoavailability, only five sample areas could be chosen which were both adequately diverse and for which aerial photos were available for enough previous dates. The five areas are shown on Figure 3-1. They include the Laurel Lake area near Townsend, a rural area near Friendsville centered on Big Springs, a highly suburbanized area just outside of Alcoa/Maryville along Route 411, a less developed suburban area southeast of Maryville and a very isolated rural area along the National Park boundary near Townsend. In each of these sample areas, house counts were made from aerial photos taken in 1953, 1967, 1973 and 1980 and converted to population based on an average persons per household rate determined from 1950-1980 Census data. This data was graphed in terms of persons per square mile and then historical growth rates from 1953 to 1980 were established. The rates were determined using different techniques depending on what was most applicable to the given data--linear regression, nonlinear regression and, in one case, a series of different linear rates. These rates were then projected backward and forward to provide an adequate range to match with the 1980 population densities in each population district.

The actual projection for each district was then developed using the following series of steps:

1. Determine growth-controlling characteristics for population district;
2. Match with most appropriate sample area;
3. Determine 23 year growth rate for sample area beginning with year when density matched that of population district;
4. Apply this rate to population district.

In most cases, a clear match was possible between sample area and population district but in some cases sample growth rates were averaged between two sample areas to provide a best match.

The output of this process resulted in raw population totals which were then corrected based on a control total for the EIS study area. This figure, 35,780, was arrived at by assuming that the EIS study area will grow from 1980 to 2000 at the same rate as the County as a whole. Given the County population projection for the year 2000 of 92,900 developed by the Bureau of Economic Analysis, this 20-year rate is 19.5 percent.

Correction of the raw numbers to agree with this control total was achieved by modifying each district's rate of growth proportionally by the amount which the total rate of growth had to be decreased to meet the control. That is, if the rate of growth for the total study area had to be decreased by 5 percent to meet the control, then each district's rate of growth was decreased by 5 percent. Intermediate year populations within each district were then corrected to match the 2000 figure by assuming the same proportion of growth during each 5 year period as had been true with the raw total. For example, if the corrected 1980-1985 growth in a district represented 40 percent of the 1980-2000 growth with the raw total, this period was assumed to represent 40 percent of the lower 1980-2000 growth based on the controlled 2000 number. The final figures are shown in Table 3-1. Comments on the projections have been received from the Blount County Planning Commission and the East Tennessee Development District. These comments are included at the end of Appendix A.

A.1.4 Seasonal Populations

The total population in Blount County also includes seasonal residents in motel rooms, campgrounds and second homes. The population projection above includes the second home residents since it was based on a house count which did not differentiate seasonal and permanent dwellings. There are also seasonal residents in motels and campgrounds, especially in the Townsend area which must be added into the population base in order to obtain accurate projections of wastewater flow.

The estimate of future seasonal population in Townsend was developed by projecting motel and campground accommodations based on future visitation to the Great Smoky Mountain National Park using the present ratio of accommodations to visitation. Total visitation was used in place of actual visitors (a visitor may return more than once during the year, therefore visitation is a larger number) because the Park Service has most definite records of visitation. This projection makes the following assumptions: (1) demand for accommodations in Townsend is due only to National Park visitation and (2) the present level of accommodations is a valid reflection of demand and that there is no latent or unfulfilled demand.

Park visitation for 2000 was estimated at 11.2 million by projection from the historical rates between 1971 and 1980. Of this total visitation, it is estimated that over 2 million will enter through Townsend based on about 19 percent of entrants using Townsend. This percentage is based on extrapolation of the trend from 1975 to 1980 (EIS Environmental Inventory Task Report, 1981).

Total motel users are estimated to be 7 percent and campers are estimated to be 30 percent of total Townsend park entrants based on the number of accommodations in 1980. Assuming that these total percentages stay constant through 2000, total accommodations are projected to be 1,512 combined motel rooms and camp sites. The methodology for developing these figures is shown in Table A-1.

TABLE A-1

METHODOLOGY FOR PROJECTING TOURIST ACCOMMODATIONS

1980

NPS Total visitation	8,441,000 visitors
Townsend % entrants	16%
Total Townsend Visitors	1,350,000

	Motel	Camping
Overnight users	96,968 (7%)	402,960 (30%)
Peak 3 mos. @ 45%(1)	43,636	181,332
Average nightly @ 92 nights(1)	474	1,971
Total accommodations at 3 persons each(1)	158	657
Total accommodations @ 85% occupancy(1)	186	773

2000

NPS Total visitation	11,215,000
Townsend % entrants	19%
Total Townsend Visitors	2,130,000

	Motel	Camping
Overnight users	149,100 (7%)	639,000 (30%)
Peak 3 mos. @ 45%(1)	67,095	287,550
Average nightly @ 92 nights(1)	729	3,126
Total accommodations at 3 persons each(1)	243	1,042
Total accommodations @ 85% occupancy(1)	286	1,226

(1) Occupancy factors developed for Appalachian Mountain resort complexes by the Appalachian Regional Commission. Research Report No. 14 Recreation Potential in the Appalachian Highlands: A Market Analysis, URS Research Company, March 1971.

NOTE: The peak 3 months of park visitations are July, August and either June or October.

A.2 Wastewater Flow Projection Methodology for the Study Area

Issue Summary

- New flow projections are needed based on population projections presented in Chapter 3 and the methodology presented in this appendix.

- Sizes of facilities are needed to estimate costs and, to a lesser extent, environmental impacts.

Objective of this Section

- To outline the methodology and assumptions for determing sizes of wastewater facilities for the study area.

Setting

- Different maximum flows are utilized in engineering practices to size different types of facilities.

- Flows through the end of the planning period (the year 2000) from residences, businesses and industries in the study area must be considered.

- Other factors to consider are seasonal flows in the Townsend area and infiltration to sewer lines as a result of rainy periods.

The purpose of projecting wastewater flows is to establish the size of wastewater facilities to be evaluated in this EIS.

Flows used to size wastewater facilities are based on water demands. The average 1980 water demands for the Friendsville, South Blount and Tuckaleechee water service areas was 66 gallons per person per day (gpcd) based on demands of 67, 69 and 51 gallons per person per day, respectively (EIS Environmental Inventory Task Report, 1981). Assuming 70 percent of this water becomes wastewater (Metcalf & Eddy, 1972), 46 gpcd of wastewater was generated at homes in the study area during 1980. Peak flows for sewer designs are then based on 46 gpcd and the population served, infiltration and wastewater generated by business (including motels and campgrounds in Townsend) and industries.

For the purposes of sizing wastewater treatment plants and disposal sites, maximum 24-hour hydraulic loadings projected for the year 2000 are utilized. These flows are assumed to be equal to two times the average 24-hour, year 2000 flow except in Townsend where maximum hydraulic loadings occur during summer tourist months. The factor of two is based on engineering experience across the United States (Metcalf & Eddy, 1972). Before facilities are designed in detail, maximum hydraulic loadings for the year 2000 should be estimated based on flow variations from day-to-day in other eastern Tennessee rural areas.

bc
pc

Blount County Planning Commission

Room G-12 County Courthouse
Maryville, Tennessee 37801
Phone 984-3620

December 2, 1981

Mr. Robert Cooper
EIS Project Officer
U.S. Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30308

Dear Mr. Cooper:

Pursuant to your request, we have reviewed the population projections for the Blount County 201 EIS. The staff found your methodology acceptable and the population projections very reasonable.

At the November meeting of the Blount County Planning Commission, we presented the maps and projections to the commissioners for their review. I am enclosing a motion which was passed by the commission expressing their approval of the population projections.

If this office can be of any further assistance to you, please contact us.

Sincerely,

Fred H. Metz
DIRECTOR

FHM:bc
Enclosure (1)

ENVIRONMENTAL IMPACT STATEMENT
RECEIVED
DEC 07 1981
REGION IV - EPA

MOTION:

Based on staff recommendation as of November 24, 1981 the Blount County Planning Commission does hereby approve and concur with the U.S. Environmental Protection Agency's population projections for the Blount County 201 Environmental Impact Study. It is recommended these projections be re-evaluated at least every five (5) years.

David T. Black, Chairman
BLOUNT COUNTY PLANNING COMMISSION

Dated 11-24-81

etdd east tennessee development district

counties
anderson
blount
campbell
claiborne
cocke
grainger
hamblen
jefferson
knox
loudon
monroe
morgan
roane
scott
sevier
union

cities
alcoa
blaine
caryville
clinton
cumberland gap
dandridge
farragut
friendsville
gatlinburg
greenback
harriman
huntsville
jacksboro
jefferson city
jellico
kingston
knoxville
lafollette
lake city
lenior city
loudon
luttrell
madisonville
maryville
maynardville
morristown
new market
new tazewell
newport
norris
oak ridge
oakdale
oliver springs
oneida
parrottsville
philadelphia
pigeon forge
pittman center
rockford
rockwood
rutledge
sevierville
sweetwater
tazewell
tellico plains
townsend
vonore
wartburg
white pine

November 19, 1981

Mr. Robert C. Cooper
EIS Project Officer
United States Environmental
Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30308

Dear Mr. Cooper:

Subject: Population Projection for Blount County 201 EIS

We concur in the population projection for Blount County for 201 statement purposes at this time. Obviously, we would want to re-study the situation after five years. We think it would be very possible for that much time to pass before any significant 201 construction might get underway.

In regard to the tourist figures for Townsend, there is a difference between the number of visitors and the number of visits. I think the 11.215 million projection is visits. This would, I think, be something like 4.5 million different visitors, a number of whom are local and need no accommodations.

The ratio between campsites and motel rooms seems unusual and perhaps should be re-studied, although I have no facts at hand to back up my concern. The projected number of motel rooms, 286, up only from 186, seems quite low. I think even without public sewer, there will be more than this number developed with the owners handling their own treatment facilities. With public sewer, there should be a much larger number of rooms. It's unlikely that Townsend will stay almost like it is for the next twenty years.

Gatlinburg and Pigeon Forge visitors show that tourism in the vicinity can no longer be tied strictly to National Park statistics. Visitors now come to Pigeon Forge and Gatlinburg and never set foot inside the Park. The same thing could happen at Townsend.

ENVIRONMENTAL IMPACT STATEMENT
BRANCH
RECEIVED
NOV 24 1981
REGION IV - EPA

Yours truly,

Robert E. Freeman
Deputy Director

REF/bm
Fred Metz

APPENDIX B

THREATENED OR PROTECTED PLANTS AND ANIMALS

Table B-1. following, lists plants in the Blount County Study area which the Smithsonian Institution or Tennessee Heritage Program has identified as threatened. Table B-2 provides related information for animals. Table B-3 provides more specific habitat data for fish species deemed either threatened or of special concern.

TABLE B-1

PLANTS OF THE BLOUNT COUNTY AREA MONITORED BY THE TENNESSEE HERITAGE PROGRAM

SPECIES	COMMON NAME	STATUS*		OCCURRENCE**		
		SI	THP	BLOUNT	SEVIER	MAP#
Abies fraseri	Fraser Fir	-	S		X	
Adlumia fungosa	Climbing Fumatory	-	T	X	X	
Amelanchier sanguinea	Serviceberry	-	T		X	
Aureolaria patula	False Foxglove	T	P		X	
Botrychium matricariaefolium	Matricary Grape Fern	-	S		X	
Bromus ciliatus	Fringed Brome	-	S		X	
Cacalia rugelia	Rugel's Ragwort	T	E		X	
Calamagrostis cainii	Reed Grass	T	E		X	
Campanula aparinoides	Marsh Bellflower	-	S		X	
Cardamine clematitis	Mountain Bittercress	-	T	X	X	
Cardamine flagellifera	Cardamine	-	T	X	X	16
Carex misera	Sedge	T	T	X	X	
Carex muricata var.ruthii	Sedge	-	T	X	X	
Carex rostrata	Sedge	-	S		X	
Carex trisperma	Sedge	-	S	X		
Clintonia borealis	Clinton's Lily	-	S		X	
Cladrastis lutea	Yellow-wood	T	-	X	X	9
Crotalaria purshii	Rattlebox	-	P	X		
Cymophyllus fraseri	Fraser Sedge	T	T	X	X	21,23
Diervilla lonicera	Bush-honeysuckle	-	T		X	
Draba ramosissima	Branching Whitlow Grass	-	T	X		10
Euonymus obavatus	Running Strawberry Bush	-	T		X	

TABLE B-1 (Cont.)

SPECIES	COMMON NAME	STATUS*		OCCURRENCE**		
		SI	THP	BLOUNT	SEVIER	MAP#
Fimbristylis puberula	Hairy Fimbristylis	-	T	X		
Fothergilla major	Witch Alder	-	T		X	
Gaylussacia ursina	Huckleberry	-	T	X	X	6,12,14 15,20
Gentiana linearis	Narrow-leaved Gentian	-	T		X	
Geum radiatum	Avens	E	E	X	X	
Glyceria nubigena	Manna Grass	E	E	X	X	
Helianthemum bicknellii	Frostweed	-	S	X		
Helianthemum canadense	Long-branched Frostweed	-	S	X	X	
Helianthemum propinquum	Frostweed	-	S	X		4
Heracleum maximum	Cow-parsnip	-	S	X		
Hypericum mtichellianum	Mitchell's St. John's Wort	-	T	X		
Hydrophyllum virginianum	Johns-cabbage	-	T		X	
Hypericum graveolens	Mountain St. John's Wort	-	T		X	
Juncus gymnocarpus	Naked Fruit Rush	T	T	X	X	24
Lilium canadense	Canada Lily	-	T		X	
Linnaea borealis	Twin-flower	-	P		X	
Listera smallii	Kidney-leaf Twayblade	-	P		X	
Lonicera canadensis	American Fly-honeysuckle	-	S		X	
Lycopodium annotinum	Bristly Clubmoss	-	P	X		
Lycopodium selago	Fir Clubmoss	-	T		X	
Lysimachia fraseri	Loosestrife	-	T		X	

TABLE B-1 (Cont.)

SPECIES	COMMON NAME	STATUS*		OCCURRENCE**		
		SI	THP	BLOUNT	SEVIER	MAP#
Melanthium hybridum	Bunch-flower	-	P		X	
Mensiesia pilosa	Minnie-bush	-	S		X	
Monotropsis odorata	Pygmy Pipes	-	T	X	X	11
Panax quinquefolium	Ginseng	T	T	X	X	3,8
Pieris floribunda	Fetterbush	-	T		X	
Platanthera psycodes	Small Purple Fringed Orchis	-	T		X	
Plantanthera peramoena	Purple Fringeless Orchid	T	-		X	
Poa saltuensis	Meadow Grass	-	S	X		5
Polygonum cilinode	Fringed Black Bindweed	-	P	X		
Populus gradidentata	Large-toothed Aspen	-	X		X	
Prenanthes roanensis	Rattlesnake Root	T	T		X	
Prunus virginiana	Choke Cherry	-	S	X	X	7
Pycnanthemum montanum	Mountain Mint	-	T	X	X	2
Saxifrage careyana	Saxifrage	T	-	X	X	18
Scirpus cespitosus	Tufted Club-rush	-	T		X	
Sparganium androcladum	Branching Bur Reed	-	S	X		13
Stachys clingmanii	Hedge-nettle	-	T	X	X	
Stellaria longifolia	Long-leaved Stitchwort	-	S	X		
Streptopus roseus	Coral Berried Twisted Stalk	-	X		X	
Thalictrum coriaceum	Leathery-leaved Meadow Bush	-	T		X	
Thelypteris phegopteris	Northern Beech Fern	-	S		X	
Trichomanes petersii	Dwart Filmy Fern	-	E	X	X	17,19,22
Tsuga caroliniana	Carolina Hemlock	-	S		X	

TABLE B-1 (Cont.)

SPECIES	COMMON NAME	STATUS*		OCCURRENCE**		
		SI	THP	BLOUNT	SEVIER	MAPS#
Woodwardia virginica	Virginia Chainfern	-	S	X		
Xerophyllum asphodeloides	Turkey Beard	-	T	X		1

*Status: Based on listings by Smithsonian Institute - SI (Ayensu & DeFilipps 1978) and the Tennessee Heritage Program - THP; E = Endangered, T = Threatened, S = Special Concern, P = Possible extirpated.

**Occurrence: Based on records for Blount and Sevier Counties obtained from the Tennessee Herritage Program. Map # refers to documented locations of monitored species as shown in Figure 3-4.

TABLE B-2

PROTECTED AND MONITORED ANIMALS OF THE BLOUNT COUNTY AREA

GROUP SPECIES	COMMON NAME	HABITAT	STATUS* F	 S	 THP	OCCURRENCE** SEVIER	 BLOUNT	 MAP#
Amphibians								
Cryptobranchus a. alleganiensis	Hellbender	Streams	-	D	S		X	E,G
Hemidactylium scutatum	Four-toed Salamander	Sphagnum & woodland bogs	-	S	S		X	J
Reptiles								
Anolis c. cardinensis	Green Anole	Pine forests	-	D	S		X	
Chrysemys scripta troosti	Cumberland Turtle	Marshes, ponds w/vegetation	-	D	S		X	
Cnemidophorus s. sexlineatus	Six-lined Racerunner	Dry open areas	-	D	S		X	
Ophisaurus attenuatus longicaudus	E. Slender Glass Lizard	Dry fields, open forests	-	D	S		X	F
Pituophis melanoleucus	Northern Pine Snake	Pine forests, mtn. ridges	-	T	T		X	
Birds								
Aquila chrysaetos	Golden Eagle	Deciduous mtn. forests	-	E	T		X	
Cathartes aura	Turkey Vulture	Deciduous forests	-	D	S	X	X	
Chondestes grammacus	Lark Sparrow	Fields	-	D	S	X		
Coragyps atratus	Black Vulture	Open areas	-	D	S		X	K
Corvus corax	Common Raven	Coniferous forests	-	E	E	X		
Falco peregrinus anatum	Peregrine Falcon	Open lands near lakes, rivers	E	E	E	X		
Fulica americana	American Coot	Marshes	-	-	S		X	C
Gallinula chloropus	Common Gallinule	Marshes	-	-	T		X	C,D
Ixobrychus exilis	Least Bittern	Marshes	-	D	T		X	C,D

TABLE B-2 (Cont.)

GROUP SPECIES	COMMON NAME	HABITAT	STATUS*			OCCURRENCE**		
			F	S	THP	SEVIER	BLOUNT	MAP#
Limnothlypis swainsonii	Swainson's Warbler	Rhodendron thickets in mtns.	-	D	S		X	
Nuttallornis borealis	Olive-sided Flycatcher	Spruce-fir forests in mtns.	-	-	S	X		
Nyctanassa violaceae	Yellow-crowned Night Heron	Marshes, swamps	-	-	T	X	X	C,D
Nycticorax nycticorax	Black-crowned Night Heron	Marshes	-	T	T	X	X	A,C,D
Passerculus sandwichensis	Savannah Sparrow	Fields, marshes	-	-	S		X	C,D
Picoides borealis	Red-cockaded Woodpecker	Mature pine forests	E	E	E		X	H
Porphyrula martinica	Purple Gallinule	Marshes	-	-	T		X	C,D
Rallus elegans	King Rail	Marshes	-	-	E		X	C,D
R. limnicola	Virginia Rail	Marshes	-	-	E		X	C,D
Sphrapicus varius	Yellow-bellied Sapsucker	Deciduous forests & edges	-	D	S	X	X	
Tyto alba	Barn Owl	Fields, farms, forest edges	-	D	E		X	B
Mammals								
Condylura cristata	Star-nosed Male	Near streams, marshes	-	D	S	X		
***Felis concolor	Eastern Cougar	Remote forests in mtns.	E	E	E			
Glaucomys sabrinus	Northern Flying Squirrel	Coniferous & mixed forests	-	D	S	X	X	
Lutra canadensis	River Otter	Streams, lake edges	-	T	T	X	X	
Myotis leibii	Small-footed Bat	Caves, tunnels, etc., in forests	-	D	S	X		
M. sodalis	Indiana Bat	Caves, hollow trees	E	E	E	X	X	I
Napeozapus insignis	Woodland Jumping Mouse	Forests, brush, near water	-	D	S	X	X	
Neotoma floridana	Eastern Woodrat	Rocky cliffs	-	D	S	X	X	

TABLE B-2 (Cont.)

OUP SPECIES	COMMON NAME	HABITAT	STATUS* F	STATUS* S	STATUS* THP	OCCURRENCE** SEVIER	OCCURRENCE** BLOUNT	OCCURRENCE** MAP#
Parascalops breweri	Hairy-tailed Mole	Sandy loam	-	D	S	X	X	
Plecotus rafinesquii	Eastern Big-eared Bat	Caves, tunnels, buildings	-	D	S	X	X	
Sorex cinereus	Masked Shrew	Moist forests, fields	-	D	S	X		
S. dispar	Long-tailed Shrew	Rocky areas in deciduous forests	-	D	S	X		
S. fumeus	Smoky Shrew	Birch/hemlock forests	-	D	S	X	X	
S. longirostris	Southeastern Shrew	Moist fields, forests	-	D	S	X		
S. palustris	Northern Water Shrew	Cold, small streams in mtns.	-	D	S	X		
Spilogale putorius	Eastern Spotted Skunk	Brush, open firests near water	-	-	S	X	X	
Sylvilagus transitionalis	New England Cottontail	Open forest, brush in mtns.	-	-	S	X		
Synaptomys cooperi	Southern Bog Lemming	Bogs, wet meadows	-	D	S	X	X	

*Status: Based on listings by Federal government (F), State of Tennessee (S), and Tennessee Heritage Program (THP); E = Endangered, T = Threatened, S = Special Concern, D - Deemed in need of management.

**Occurrence: Based on documented records for Sevier and Blount Counties obtained from the Tennessee Heritage Program. Map # refers to documented locations of protected and monitored species as shown in Figure 3-4.

***The Eastern Cougar is believed to be extirpated in the study area region (Linzey & Linzey 1971).

TABLE B-3

SPECIFIC HABITAT INFORMATION FOR THE FISH SPECIES THAT ARE CONSIDERED AS EITHER THREATENED OR DEEMED OF SPECIAL CONCERN BY THE FEDERAL AND STATE PROTECTION LISTS

SPECIES	BOTTOM TYPE	CURRENT	BREEDING GROUNDS	GENERAL HABITAT	DEPTH	SITE*	RANGE**
Ashy Darter (*Etheostoma cinereum*)	bedrock "boulder" runs	sluggish (slow)	clean,silt-free riffles	silt-free shaded banks and backwaters	2 feet or more	1	A-A'
Duskytail Darter (*Etheostoma catonotus* sp.)	bedrock "boulder" runs	slow to moderate	clean, silt-free riffles	silt-free shaded backwaters	deep runs 2-4 ft.	2	B-B'
Longhead Darter (*Percina macrocephala*)	sand and debris	moderate	silt-free riffles with big boulders	side channel runs	deep runs 3-4 ft.	5	E-E'
Tangerine Darter (*Percina aurantiaca*)	hard bottoms	moderate to swift	riffles	mid-river	deep runs	4	D-D'
Blotchside Darter (*Percina burtoni*)	gravel bottoms	moderate	riffles	mid-river	moderate runs	3	C-C'
Mountain Redbelly Dace (*Phoxinus oreas*)	rocks and gravel	moderate	riffles	spring fed tributaries and seepage areas	1-2 ft		
Flame Chub (*Hemitremia flammea*)	rocks and gravel	moderate	riffles	spring fed tributaries and seepage areas	1-2 ft.		

*Sites based on data from the Tennessee Heritage Program.

**Ranges based on ongoing research University of Tennessee; Knoxville, TN. Designations refer to locations on Figure 3-4

Source: Starnes, Etnier and Dickenson; University of Tennessee; Knoxville, TN. Personal Communications (1980).

APPENDIX C

ENVIRONMENTALLY SIGNIFICANT AGRICULTURAL LAND

Prime farmland has been defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and is also available for these uses. It has the soil quality, growing season and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. Prime farmlands are permeable to water and air. They are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Examples of soils that qualify as prime farmland are Decatur, Hermitage, Dewey and Etowah, 0 to 6 percent slopes. Table C-1 presents a list of soils that were considered as prime farmland. Figure 3-5 shows the location of prime farmland within the study area. This figure was derived from mapped data provided by the SCS and has been generalized in order to be presented at this scale. As the map indicates, there are areas of prime land scattered throughout most of the study area. Only in the more mountainous southern section is prime farmland sparse. There only the cove areas show any occurrence of prime lands. Isolated pockets of prime soils occur on terraces along Loudoun Reservoir but the primary concentrations are found in the flatland areas adjacent to Maryville and Alcoa and along the Little River and other stream valleys. Much of what is now developed portions of Alcoa and Maryville was originally prime farmland and the areas adjacent to the cities are threatened from the pressures of continued development. It is also important to point out that locations of probable future growth also contain areas of prime farmlands. In the Shooks Gap and Townsend areas for example, extensive amounts of the developable land is prime farmland.

A further category of farmland that is considered to be environmentally significant addresses lands which are "unique", or of statewide or local importance. These lands are also important based on their productive capability but in a relative sense as opposed to the intrinsic value attributed to prime land. In this regard, these types of ESAL are defined as follows:

TABLE C-1

SOIL PHASES INCLUDED IN INTERPRETIVE MAP OF PRIME FARMLAND

Aa	Alcoa loam, eroded gently sloping phase, 2-5% slopes.
Ab	Alcoa loam, eroded sloping phase, 5-12% slopes.[1]
An	Allen fine sandy loam, eroded sloping, 5-12% slopes.[1]
Ap	Allen silt loam, eroded sloping phase, 5-12% slopes.[1]
Ba	Barbourville fine sandy loam, gently sloping phase 2-5% slope.
Bb	Barbourville silt loam, gently sloping phase, 2-5% slope.
Bc	Barbourville silt loam, sloping phase, 5-12% slope.
Cl	Cumberland silty clay loam, eroded gently sloping phase, 2-5% slope.
Dk	Decatur silty clay loam, eroded gently sloping phase, 2-5% slope.
Dl	Decatur silty clay loam, eroded sloping phase, 5-12% slopes.[1]
Ds	Dewey silty clay loam, eroded gently sloping phase, 2-5% slope.
Dt	Dewey silty clay loam, eroded sloping phase, 2-5% slope.
Dn	Dewey silt loam, sloping phase, 5-12% slope.[1]
Daa	Dunmore silty clay loam, eroded gently sloping phase, 2-5% slope.
Dab	Dunmore silty clay loam, eroded sloping phase, 5-12% slope.[1]
Dv	Dunmore silt loam, sloping phase, 5-12% slope.[1]
Ea	Emory silt loam, level phase, 0-2% slope.
Eb	Emory silt loam, gently sloping phase, 2-6% slope.
Ec	Emory silty clay loam, gently sloping phase 2-5% slope.
Ed	Etowah silt loam, eroded gently sloping phase, 2-5% slope.
Ee	Etowah silt loam, eroded sloping phase, 5-12% slope.[1]
Fb	Farragut silty clay loam, eroded gently sloping phase, 2-5% slope.
Fc	Farragut silty clay loam, eroded sloping phase, 5-12% slope.[1]
Ga	Greendale silt loam, 1-6% slope.
Hb	Hamblen silt loam, 0-2% slope.
Hc	Hamblen silt loam, local alluvium, phase, 0-2% slope.
Ha	Hamblen loam, 0-2% slope.
Hd	Hayter silt loam, gently sloping phase, 2-5% slope.
He	Hayter silt loam, sloping phase, 5-12% slope.[1]
Hg	Hayter stony silt loam, sloping phase, 5-12% slope.[1]
Hh	Hermitage silt loam, gently sloping phase, 2-5% slope.
Hk	Hermitage silt loam, eroded gently sloping phase, 2-5% slope.

TABLE C-1 (Cont.)

Hl	Hermitage silt loam, eroded sloping phase, 5-12% slope.[1]
Je	Jefferson fine sandy loam, gently sloping phase, 2-5% slope.
Jf	Jefferson fine sandy loam, eroded sloping phase, 5-12% slope.[1]
Jc	Jefferson cobbly fine sandy loam, sloping phase, 5-12% slope.[1]
LA	Leadvale silt loam, gently sloping phase, 2-5% slope.
LB	Leadvale silt loam, eroded gently sloping phase, 2-5% slope.
Lc	Leadvale silt loam, eroded sloping phase, 5-12% slope.[1]
LE	Lindside silt loam, 0-2% slopes.
MA	Melvin silt loam, 0-2% slopes.
Mb	Minvale silt loam, eroded gently sloping phase, 2-5% slopes.
MC	Minvale silt loam, eroded sloping phase, 5-12% slopes.[1]
Na	Neubert loam, 2-5% slopes.
PA	Pace silt loam, gently sloping phase, 2-5% slopes.
PB	Pace silt loam, eroded sloping phase, 5-12% slopes.[1]
PC	Prader silt loam, 0-2% slopes.
Sb	Sequatchie fine sandy loam, 1-3% slopes.
Sc	Sequatchie loam, 1-3% slopes.
Sd	Sequatchie silt loam, 1-3% slopes.
Sh	Staser fine sandy loam, 0-2% slopes.
Sk	Staser loam, 0-2% slopes.
Sl	Staser silt loam, 0-2% slopes.
Tn	Tellico loam, eroded sloping phase, 5-12% slopes.
Wa	Waynesboro loam, eroded gently sloping phase, 2-5% slopes.
Wb	Waynesboro loam, eroded sloping phase, 5-12% slopes.
Wd	Whitesburg silt loam, gently sloping phase, 1-5% slopes.
We	Whitwell loam, 0-2% slopes.

[1] These soils shown only when mapped adjacent to soils otherwise considered prime and unique.

Source: Dewey P. Simpson. District Conservationist, U. S. Department of Agriculture, Soil Conservation Service. 1980.

Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods.

Farmland of statewide importance is, in addition to prime and unique farmlands, significant for the production of food, feed, fiber, forage, ornamental and oilseed crops. Criteria for defining and delineating this land is to be determined by the appropriate state agency or agencies.

Farmland of local importance is not identified as having national or statewide importance. In some local areas, however, it is economically important and environmentally sound for certain additional farmlands for the production of food, feed, fiber, forage, ornamental and oilseed crops. Where appropriate, these lands may be identified by the local agencies concerned. Identification of these areas was carried out with the assistance of the U. S. Department of Agriculture extension agent and district conservationist.

As mentioned in the beginning of this section, tobacco is a very important local crop in terms of its role in total agricultural sales. Although tobacco is grown on prime land, it may also be grown on more steeply sloping soils in the Decatur, Hermitage and Cumberland series (Simpson, 1980). It is also important to note that these soils where tobacco may be grown are found reaching across the middle of the County through Alcoa and Maryville (Deere, 1980) in the path of continuing development.

Prime farmland, unique farmland and farmland of state or local importance are categories of significant farmland that have been recognized and defined by the U. S. Department of Agriculture. In addition, EPA has identified a further grouping of environmentally significant agricultural land (ESAL) which includes other farmlands that may have the ability to help maintain or improve environmental quality. The specific categories included within this group and their definitions are:

Farmlands in or contiguous to Environmentally Sensitive Areas (ESA's), such as floodplains, wetlands, aquifer recharge zones or natural scientific study areas; these farmlands play a crucial environmental buffer role to prevent development from encroaching on ESA's, thereby protecting their capability to remain environmentally productive and stable.

Farmlands of waste utilization importance which may serve in the land treatment process, be used for composting activities or for controlled beneficial application of sewage sludges or other wastes.

Farmlands with significant capital investments in Best Management Practices (BMP's), which serve as elements of an area's (or state's) soil erosion and nonpoint source pollution control plans.

Farmlands contiguous to environmentally sensitive areas would include those lands adjacent to the Little River and the Alcoa marshes. The extent of the farmlands necessary to provide an effective buffer will vary depending on the type of sensitive resource, the ecological processes most important in its functioning and the range over which these processes operate. The nature of the encroaching activity is also important in defining a buffer zone.

The identification of lands suitable for waste utilization must consider a variety of factors including landscape, soils and soil parent materials. Soil characteristics which are important would include, for example, infiltration, permeability, ph, thickness and drainage (EPA, 1978). It must be recognized, however, that the type of application system used and its leading requirements will in large part dictate the amount of flexibility in selecting suitable locations. A very general, preliminary review of the study area considering only such soil characteristics as slope, permeability, drainage and depth to water table indicates that most of the suitable soils in the study area are also prime farmland.

Farmlands where investments in BMP's have been made were identified by the district conservationist. These farms are significant because of the monetary investiment already made, the contribution they make to improved water quality and the management example which they can provide for other farmers. In each of the cases identified here, the BMP implemented is an approved animal waste disposal system. Figure 3-5 shows the location of the 13 farms where this management practice has been implemented as of October 1980 (Simpson, 1980).

APPENDIX D

ARCHAEOLOGICAL AND HISTORICAL RESOURCES

The following description presents a preliminary discussion of the general arachaeology of the Appalachian summit and of the Blount County area.

Middle and Late Archaic Period (See Table D-1)

This discussion begins with the Middle Archaic period since earlier periods for this area are not well defined. Several projectile points which, on the basis of typology, represent periods earlier than the Morrow Mountain Phase, have been identified in the area. These lithic materials are widely dispersed and are associated with little contextual information. It is assumed currently that the cultural sequence of the mountains follows the same course of development that occurred on the Piedmont until the earliest South Appalachian elements were introduced. If this estimate is correct, the Appalachian summit was inhabited at least 9,000 to 9,500 years ago.

Early corner notched and fluted points have been found in the Southern Highlands but it is not until the Morrow Mountain Phase that a distinct cultural pattern begins to emerge. This phase is characterized by Morrow Mountain stemmed projectile points and was defined on the basis of investigations of deeply stratified sites in central North Carolina containing stemmed and corner notched projectile points, scrapers and tubular atlatl weights. Radiocarbon dates of 5045 ± 245 B.C. are associated with this phase. The presence of Morrow Mountain I stemmed points at Warren Wilson (Bn 29) indicated that Mountain Indians were making projectile points on the same pattern that people on the Piedmont used during the Middle Archaic.

The Late Archaic is generally marked by a return to modern climatic conditions, an increase in population and the expansion of the economic base. The Late Archaic period is dated from approximately 4000 to 1000 B.C. The projectile point/knives which are diagnostic of the Late Archaic

TABLE D-1

ARCHAEOLOGICAL SEQUENCE

Date	Tradition	Period	Phase
A.D. 1500	Euro-American	Historic	Cherokee
	South Appalachian	Proto-Historic	Qualla
		Late Mississippian	Pisgah
A.D. 1000	Mississippian	Middle Mississippian	
		Early Mississippian	
A.D. 500		Late Woodland	Connestee
A.D. B.C.			
	Woodland	Middle Woodland	
500 B.C.			
			Pigeon
		Early Woodland	Swannanoa
2000 B.C.	Archaic	Late Archaic	Savannah River
4000 B.C.			
6000 B.C.		Middle Archaic	Marrow Mountain
8000 B.C.		Early Archaic	

include Savannah River and other Late Archaic stemmed projectile points. Other associated artifacts include steatite bowls, bar gorgets, ground stone axes, large elbow pipes, notched net weights, pebble hammerstones, large crude bifaces and flake scrapers.

The Late Archaic layer is the major component in the large shell mounds along the Tennessee River and has been compared to other Archaic complexes on the Savannah and Ohio Rivers. In the Tennessee Valley, these sites tend to increase as one travels downstream, with a well developed Archaic sequence below Knoxville represented by fairly intensive middens. These middens become larger and deeper until Muscle Shoals, where some of the most spectacular stratified Archaic Middens in North America occur. Lafferty (1978) has interpreted this pattern as possible meaning a migrational pattern from the northeast, with the movement of ceramic-producing people somewhere around 900 B.C.

Woodland Period

The Woodland Period in surrounding regions is characterized by the introduction of ceramics, triangular and small stemmed projectile points and semi-permanent villages. The Woodland Period is dated 1000 B.C. to A.D. 500 and may be sub-divided into Early, Middle and Late. Population dynamics during the Early Woodland period appears to have been relatively unstable, suggesting population movement from the lower Ohio and Illinois River basins, creating the Middle Eastern Tradition. The first ceramics found at Watts Bar by Lafferty (1978) were quartzite tempered and poorly made. These were rapidly replaced by limestone tempered pottery.

The Pigeon Phase of the Early Woodland is identified solely by its pottery. Pigeon ceramics are characterized by crushed quartz temper, while vessel forms were conical jars, open hemispherical bowls and shouldered jars with slightly flaring rims. Little elaboration was present, although some lips are notched or paddle marked. According to Keel (1976), sites producing typical Pigeon series ceramics are found on all topographic forms.

Prior to the Pigeon Phase (Swannanoa Phase) the area ceramics displayed a strong northern relationship in their manufacture. Cord-marked or fabric impressed conical jars and simple bowls were the common forms of vessels. Contact with the Adena Culture of the Ohio Valley appears to not have taken place during either the Swannanoa or Pigeon Phases. Settlements during the Swannanoa period are present in all micro-environments and appear to have developed from the earlier Archaic complex resident populations. The northern influence blended with the Southern Appalachian element by the end of the Pigeon phase.

The latest of the Woodland tradition for the Southern Highlands is the Connestee Phase. A likely duration between A.D. 100 and A.D. 600 has been suggested. The ceramics of this phase differ from other periods in that they are relatively thin in comparison with both earlier and later pottery. Variable surface finishes were used with conoidal or hemi-spherical vessels with constricted necks and flaring rims.

South Appalachian Mississippi

Platform mounds and rectangular stamped ceramics are attributed to South Appalachian Mississippian Tradition. In the Southern Appalachian Summit this period contains the Pisgah Phase. Characteristic Pisgah vessels were stamped with rectilinear complicated stamps, the rim was collared and the vessel was shouldered. Loop handles, lugs and castellations were frequently present and bases were slightly pointed or rounded. Other clay artifacts included pipes, discoidals, animal head effigies and beads.

Arrow points were triangular and other stone implements included a variety of micro-tools, gravers, perforators and drills. Bone tools include ulna awls, splinter awls, pins and needles. Mica, in cut out forms, has been recovered along with pigments of red ochre, yellow ochre and graphite. Dwellings consisted of early lodges and substructure mounds topped with rectangular civic buildings. Structures were rectangular with wall trench entrances and raised clay fire basins. Villages were enclosed by log palisades. Wild foods secured from small upland hunting and gathering camps supplemented agricultural products produced on the flood-plains.

Burial was commonly flexed, simple pits were dug into the floor of a dwelling. Grave goods were rare and consisted of items of personal adornment. This period is presently thought to date from A.D. 1000 to A.D. 1550 but the origin of the Pisgah culture is not known.

The proto-historic and historic Cherokee period is known as the Qualla Phase. Ceramics made during this period were characterized by complicated stamping and bold incising. Projectile points were small, thin, well-made triangular forms, apparently used as arrow tips. Other stone implements included flake scrapers, side scrapers and small chipped stone drills. Celts were a common ground stone object, along with stone pipes. The shell industry was restricted to beads, gorgets, hair or ear pins, masks and ceremonial dippers. Both native and imported shells were used.

Architecture was more complex than the earlier periods and both circular and rectangular structures were used. Civic buildings were usually placed on mounds which were used as foundations. Trade relations with Europeans were established by the beginning of the 18th Century and the log cabin, made of horizontal logs heavily chinked with clay, had been introduced to the Cherokees by the English by the end of the 18th Century. Trade between European and native cultures involved swapping furs and hides for guns, blankets, knives, axes, hoes, tomahawks, beads, paint, a variety of hardware and liquor.

Proto-historic and historic cultures were broad based and utilized a number of diverse environments and natural resources. Keel (1976) recorded hunting and gathering stations or camps in mountain gaps and along stream beds. Scattered farmsteads were found in the inter-mountain zones and villages were established in association with town house mounds. These dispersed farmsteads or hamlets apparently were linked to small ceremonial centers.

National Register Sites

A list of National Register sites in Blount County includes:

Binfield Vicinity. Henry House, S.E. of Binfield on Henry Lane. (11-1-74) PH0063975.

Louisville. Louisville Historic District, between railroad tracks and Tennessee River, (12-23-74) PH0063634.

Maryville. Anderson and Memorial Halls, Maryville College Campus, (2-20-75).

Maryville Vicinity. Sam Houston School House, N.E. of Maryville on TN 8, (6-13-72) PH0063983.

Townsend. Cades Cove Historic District, 10 mi. S. W. of Townsend in Great Smoky Mountains National Park, (7-13-77).

Townsend. Little River Lumber Company Office, TN 73, (11-8-74) PH0063991.

Other proposed sites will be discussed where appropriate under "Alternatives Selection".

Cultural Environment References

Alcoa Regional Planning Commission. 1970. Comprehensive Plan 1970-1990. Alcoa, Tennessee.

Blount County Chamber of Commerce. 1979. Informational Section on Maryville-Alcoa and Blount County.

Blount County Planning Commission. 1978. Subdivision Regulations, Blount County Planning Region. Maryville.

Blount County Planning Department. 1978. Overall Economic Development Program, Blount County, Tennessee.

Blount County Regional Planning Commission. 1976. Blount County: 1990 Land Use Plan and Policy.

Brooks, Mark. South Blount Utility District Engineer. Personal Conversation. August 1980.

Buck, David. Alcoa City Engineer. Personal Conversation. May 1980.

Chapman, J. 1976. "The Archaic Period in the Lower Little Tennessee River Valley: The Radiocarbon Dates." Tennessee Anthropologist 1:1-12.

Chapman, J. 1977. Archaic period research in the lower Little Tennessee River Valley - 1975. Tennessee Valley Authority.

City of Maryville and Tennessee Valley Authority. 1980. Quality Development for the State Route 95 Corridor.

Deere, Mr. U. S. Department of Agriculture, Cooperative Extension Service. Blount County Extension Agent. Personal conversation. September, October 1980.

Dickens, R. S., Jr. 1971. South Appalachian Mississippian. Ph.D. Dissertation. Department of Anthropology. University of North Carolina, Chapel Hill.

Dickens, R. S., Jr. 1975. "A processual approach to Mississippian origins on the Georgia Piedmont." Proc. Southeast. Archaeol. Conf., Bull. 18:31-47.

East Tennessee Development District. 1977. The District and Its Economy.

East Tennessee Development District (ETDD). 1978. Land Use Plan 1979-2000.

East Tennessee Development District. 1980. "Economic Statistics". Blount County.

Ferguson, L. G. 1971. South Appalachian Mississippian. Ph.D. Dessertation. Dept. of Anthropology. University of North Carolina, Chapel Hill.

Frye, Duane. Tennessee Department of Public Health. Personal conversation. July-August 1980.

Hampton, Floyd. Blount County Health Department. 1979. Personal conversation. November 1979.

Hutchins, Neal. Tuckaleechee Utility District Engineer. Personal conversation. August 1980.

Keel, B. C. 1976. Cherokee Archaeology, A Study of Appalachian Summit. The University of Tennessee Press, Knoxville.

Kneberg, Madeline. 1957. "Chipped stone artifacts of the Tennessee Valley Area." Tenn. Archeol. 13(1).

Lafferty, R. H. 1978. "The early woodland chronological and cultural affinities at Phipps Bend on the Holston River, northeast Tennessee." J. Ala. Archaeol. 24(2).

League of Women Voters of Maryville-Alcoa. 1979. Know Your Local Government. Blount County/Maryville/Alcoa.

Leonard, Ms. Labor Relations Supervisor. Aluminum Company of America. Personal conversation. October 6, 1980.

Leonard, John. Tennessee Department of Public Health. Personal conversation. December 19, 1980.

Maryville Filtration Plant personnel. Personal conversation. August 1980.

Maryville Regional Planning Commission. 1974. Summary Plan. Maryville, Tennessee.

Metz, Fred. Director of Planning, Blount County Planning Commission. Personal conversation. September 1980.

National Agricultural Lands Study. 1980. Interim Report Number One The Program of Study. Washington, D. C.

Ogle, Rex. Superintendent, Water and Wastewater Treatment. Division of Water and Sewerage. Maryville Utilities Board. Personal conversation. July 1980.

Simpson, Dewey P. U. S. Department of Agriculture, Soil Conservation Service, District Conservationist. Personal Conversation. September, October 1980.

Staley, James. U. S. Department of Commerce, Bureau of Economic Analysis. Personal conversation. September 1980.

State of Tennessee. Tennessee Code Annotated. Chapter 17, Sections 54-17-101 through 54-17-116. Scenic Highway System Act. Nashville.

Tennessee Department of Conservation. 1976. Tennessee Comprehensive Joint Water and Related Land Resources Planning. Water Resources Planning Series No. 1.

Tennessee Department of Public Health. 1978. 208 Water Quality Management Plan for the Upper Tennessee River Basin. Division of Water Quality Control.

Tennessee State Planning Office. 1980. Critical Environmental Areas in Tennessee. VII Prime Agricultural Land. Nashville.

Ungs, Beth. Tennessee State Planning Office, Knoxville Regional Office. Personal conversation. September 1980.

U. S. Department of Commerce, Bureau of the Census. 1977. 1974 Census of Agriculture. Washington, D. C.

U. S. Department of Commerce, Bureau of the Census. 1978 Census of Agriculture Preliminary Report.

U. S. Department of Commerce, Regional Economic Information Service, Bureau of Economic Analysis. 1980. Employment by Type and Broad Industrial Sources 1973-78. Washington, D. C.

U. S. Environmental Protection Agency. 1978. Application of Sludges and Wastewaters on Agricultural Land. 1978. Washington, D. C.

University of Tennessee, Graduate School of Planning. 1977. Food Distribution and Consumption in Knoxville. Knoxville.

Wallace, William C. Deputy Director, Office of Research and Planning. Personal correspondence. September 1980.

Waller, Don. Director of Local Planning, Tennessee State Planning Office. Personal conversation. August 1980.

Wauchope, R. 1966. Archaeological survey of Northern Georgia. Memoir of the Society for American Archaeology 21.

Wauford, J. R., and Company, Consulting Engineers, Inc. 1976. 201 Facilities Plan for Blount County, Tennessee. Volume 1: Text and Volume 2: Appendix.

Whittemore, Gene. Alcoa Filtration Plant. Personal Conversation. August 1980.

Woods, Charles. J. R. Wauford and Co., Inc. Consulting Engineers. Personal conversation. July 1980.

Natural Environment References

Alcoa Regional Planning Commission. 1970. Comprehensive Plan 1970-1990, Alcoa, Tennessee.

Alsop. 1968. Birds of the Great Smoky Mountains Field Check List. GSMNP, Gatlinburg, TN.

Alsop, F. J. (undated) A Checklist of Birds of Knox County, TN. Knoxville Chapter of the Tennessee Ornithological Society.

Ayensu, E. S. and R. A. DeFillips. 1978. Endangered and Threatened Plants of the United States. Smithsonian Institute, Washington, D. C.

Blount County Chamber of Commerce. 1979. Informational Section on Maryville-Alcoa and Blount County.

Blount County Regional Planning Commission. 1976. Blount County: 1990 Land Use Plan and Policy.

Blount County Regional Planning Commission. 1979. Land Use Study and Zoning Ordinance - McGhee Tyson Off-Airport Study Area.

Braun, E. L. 1950. Deciduous Forests of Eastern North America. Macmillan Publ. Co.: New York.

Burt, W. and R. Grossenheider. 1976. A Field Guide to the Mammals. Houghton Mifflin Co., Boston.

Conant, R. 1975. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Co., Boston.

Cragwell, J. S., Jr. and J. L. Poole. 1961. The General Water Situation in Tennessee. Presented at first Tennessee SCSA Convention, Nashville, TN. June 17, 1961.

Davis, John. 1981. Tennessee Department of Public Health. Division of Water Quality Control.

Davis, S., P. Reitan, and R. Pestrong. 1976. Geology, Our Physical Environment. McGraw-Hill Book Co., New York.

DeBuchananne, G. D. and R. M. Richardson. 1956. Ground-water Resources of East Tennessee. State of Tennessee. Department of Conservation. Division of Geology. Nashville, TN.

Dickinson, W. 1980. University of Tennessee Department of Zoology. Personal communication.

East Tennessee Development District. 1979. Land Use Plan 1979-2000.

Etnier, D. A. 1978. Summary of fish collections in Tennessee for the year 1977. Univ. of Tennessee.

Etnier, D. A. and G. A. Schuster. 1979. An Annotated List of Trickoptera (Caddisflies) of Tennessee. Jour. Tenn. Acad. Sci. 54(1): 15-22.

Federal Gov't., State of Tennessee and Tennessee Heritage Program Listings for Protected and Monitored Animals of the Blount County Area.

Hampton, Floyd. Blount County Health Department. Personal communication. October 7, 1980.

Huhecy, J. and A. Stupka. 1967. Amphibians and Reptiles of Great Smoky Mountains National Park. Univ. of Tennessee Press: Knoxville.

Hunt, Robert. State of Tennessee. Department of Conservation. Water Resources Division. Personal Conversation. October 7, 1980.

Johnston, Arch. Tennessee Earthquake Information Center, Memphis State University, Memphis, TN. Personal communication.

Kernodle, J. M. and J. M. Wilson. 1973. Water Use in Tennessee 1970. State of Tennessee. Department of Conservation, Division of Geology. Nashville, TN.

King, P., R. Neuman, and J. Hadley. 1968. Geology of the Great Smoky Mountains National Park, Tennessee and North Carolina. U. S. Geol. Survey, Profess. Paper 587., Washington, D. C.

Kuchler, A. W. 1966. Potential Natural Vegetation of the United States (Maps). American Geographic Society, New York.

Leming, Earl. Tennessee Department of Public Health, Division of Water Quality Control. Telephone conversation. October 7, 1980.

Linzey, A. and D. Linzey. 1971. Mammals of Great Smoky Mountains National Park. Univ. of Tennessee Press: Knoxville.

Martin, W. H. 1971. Forest Communities of the Great Valley of East Tennessee and their relationship to soil and topographic properties. Ph.D. Dissertation, Univ. of Tenn., Knoxville.

Martin, A. C., H. S. Zim, and A. L. Nelson. 1961. American Wildlife and Plants, Dover Publ., Inc., New York (reprint).

Melgaard, D. 1980. Tennessee Water Quality Control Lab. Personal communication.

National Oceanic and Atmospheric Administration, Environmental Data and Information Service. 1965-1974. Airport Climatological Summary. Knoxville, TN, McGhee Tyson Airport.

National Oceanic and Atmospheric Administration, Environmental Data and Information Service. 1978. Local Climatological Data. Knoxville, TN.

National Park Service. 1970-July 1980. Visitor Statistics New Releases.

Odom, R. R., J. L. McCollum, M. A. Neville, and D. R. Ettman. 1977. Georgia's Protected Wildlife. GA. Department Natural Resources, Game & Fish Div., Endangered Wildlife Program, Social Circle, GA.

Odum, E. P. 1971. Fundamentals of Ecology. W. B. Saunders, Inc.: Philadelphia.

Shanks, R. E. 1954. "Climates of the Great Smoky Mountains." Ecology 35: 354-361.

Schuster, G. A. and D. A. Etnier. 1978. A Manual for the Identification of the larvae of the caddisfly genera Hydropsyche Pictet and Symphitopsycke Ullmer in eastern North America. (Trickoptera: Hydropsychidae). U.S.E.P.A. Publication No. 600/4-78-060.

Smith, D. W. 1968. Vegetational changes in a five-county area of East Tennessee during secondary succession. M. S. Thesis, Univ. of Tenn., Knoxville.

Starnes, 1980. Univ. of Tennessee, Dept. of Zoology, Personal communication.

Stupka, A. 1960. Great Smoky Mountains National Park. U.S.D.A., Nat. Park Service, Natural History Handbook Series No. 5., Washington, D. C.

Stupka, A. 1964. Trees, Shrubs, and Woody Vines of Great Smoky Mountains National Park. Univ. of Tenns. Press: Knoxville.

Tennessee Department of Public Health. 1978. Upper Tennessee River Basin 208 Plan.

Tennessee Department of Public Health. Division of Air Pollution Control. 1974-1979. Ambient Air Quality Data for the Maryville/Alcoa Area.

Tennessee Department of Public Health. Division of Air Pollution Control. October, November, December 1979. Quarterly Report of Air Quality for Tennessee and Rules of the Department of Health concerning Air Quality Standards.

Tennessee Department of Public Health, Division of Water Quality Control. 1980. "Report of Analyses" (Little River Sampling Data).

Tennessee Valley Authority. Office of Community Development. Personal income data for Blount County, Tennessee by major sources.

Tennessee Water Quality Control Laboratory. 1978. Knoxville, and Dr. David A. Etnier. University of Tennessee Department of Zoology. Aquatic Invertebrates of the Little River.

Thomas, R. D. 1966. The vegetation and flora of Chilhowee Mountain. Ph.D. Dissertation, Univ. of Tenn., Knoxville.

Thomas, R. D. 1976. "The vascular flora of Chilhowee Mountain, Blount and Sevier Counties, Tennessee." Jour. of the Tenn. Acad. Sci. 51: 118-123.

U. S. Department of Agriculture. Soil Conservation Service. 1959. Blount County, Tennessee Soil Survey.

U. S. Department of Commerce. Bureau of the Census. 1940-1960 Population Data.

U. S. Environmental Protection Agency. 1980. Land Use Analysis, Blount County, Tennessee. Environmental Photographic Interpretation Center (EPIC), Warrenton, VA. #TS-PIC-0030.

U. S. Geological Survey. 1978. Water resources data for Tennessee Water year 1978. Data report TN-78-1.

Whittaker, R. H. 1956. "Vegetation of the Great Smoky Mountains." Ecol. Mons. 26: 1-80.

Williams, M. D. 1975. A survey of the birds of the Alcoa Marshes. M. S. Thesis, University of Tenn., Knoxville.

Wilson, J. M. and J. M. Kernodle. 1971. Summary of Groundwater Data for Tennessee, through May 1971. State of Tennessee, Department of Conservation, Division of Water Resources. Nashville, TN.

Wojowitzc. 1980. Univ. of Tennessee, Dept. of Zoology, Personal Communication.